# ELECTRICAL REVIEW

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## VIEWS, NEWS AND INTERVIEWS.

A well known electrical engineer who, through pure merit, achieved the degree of Ph. D., was asked by a lady:

"Why do they call you 'doctor?'"

"Because I have the degree of Ph. D."

"Oh," observed the lady with awakening interest, "doctor of pharmacy or drug clerk?"

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A man in Nebraska owns a very fine bloodhound, which he has named "X-Rays," on account of his keen scent and other penetrating qualities.

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The Soudan is being rapidly covered with a network of telegraphs. It is expected that the telegraph will be 1,000 miles south of Khartoum at the end of the year. This means the practical joining up with Uganda, and as Rhodes's telegraph is approaching Tanganyika, the trans-continental telegraph may be expected to be finished early next year.

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Miss Maude Adams, the actress, whose first appearance as *Juliet* last week so captivated a New York audience, was telling of her nervousness before the ordeal of a "first night." As the afternoon wore away she grew desperate, and going to her manager, Mr. Frohman, she said:

"Come, now, help me out. Tell me what to do between now and six. I'm going to kill as much time as I can in making up between six and half-past seven, but suggest something for me to do between now and six."

"Take a cab," said Mr. Frohman, "and go driving in Central Park."

"Horses aren't fast enough," said she.

"Then take an electric cab."

"I did this," said Miss Adams, "and if you saw a cab rushing up Fifth avenue, that was me."

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If it takes nerve to steal electric light wire charged with a current of 1,000 volts, then four men in Newark, N. J., certainly gave an exhibition of an extraordinary variety of that quality when they stripped seven poles of heavy cable one day last week.

There's blood on the moon in Kansas, where the state authorities sternly insist that the new law reducing the legal rate of telegraph tolls 40 per cent must be obeyed. It has been announced by the State Auditor that the telegraph bills of state officials for April will not be paid unless in conformity with the reduced rate; and so the merry war between the companies and the commonwealth will soon begin, unless, in the meantime, the rates should be lowered, which the telegraph officials scout as an impossibility.

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A woman has been arrested for stealing 100,000 feet of gas from the New Bedford, Mass., Gas and Edison Light Company. What in the world could any woman want with that much gas?

A GENERAL VIEW OF THE ELECTRICAL EXHIBITION IN MADISON SQUARE GARDEN, NEW YORK, TAKEN FROM THE "ELECTRICAL REVIEW'S" HEADQUARTERS.

## The United States Government's Loan Exhibit at the New York Electrical Exhibition.

The exhibit of electrical apparatus, instruments, relics, etc., loaned by various departments of the United States Government, is one of the most interesting features of the Electrical Exhibition. The display is installed in a good position in the gallery and has attracted much interest.

The Weather Bureau, of the Department of Agriculture, displays, under the supervision of Mr. S. L. Mosby, of the New York meteorological station, a number of instruments used in observing and recording weather conditions, and a magnificent series of photographs of cloud-forms and lightning. Charts of rainfall, etc., and half-daily barometric charts of a typical storm are also shown.

Among the instruments displayed is an aluminum-vane anemometer with its dials for recording the total passage of the wind and electrical contacts for signaling and recording the passage of each mile. A sunshine recorder is also shown, consisting of a balanced glass tube having a bulb at each end and a large globule of mercury in its middle part. One of the bulbs is blackened, so that the air contained in it is heated when it is exposed to the sun's rays. This causes the air to expand, pushing the mer-

cury along the tube, tipping the apparatus and closing an electrical contact. When the sun is obscured both bulbs rapidly reach the same temperature; the globule comes back to the middle of the tube, which again balances and breaks the circuit.

A weighing rain guage is also shown, this instrument consisting of a dish delicately balanced, in which the fall of rain is received, and which tips and discharges its contents when a certain quantity of rain has fallen. This tipping is automatically registered by electricity upon a chronograph, which also receives the indications of the two instruments just described, making what is called a "three-in-one" record. Some exceedingly interesting records taken upon this instrument are exhibited.

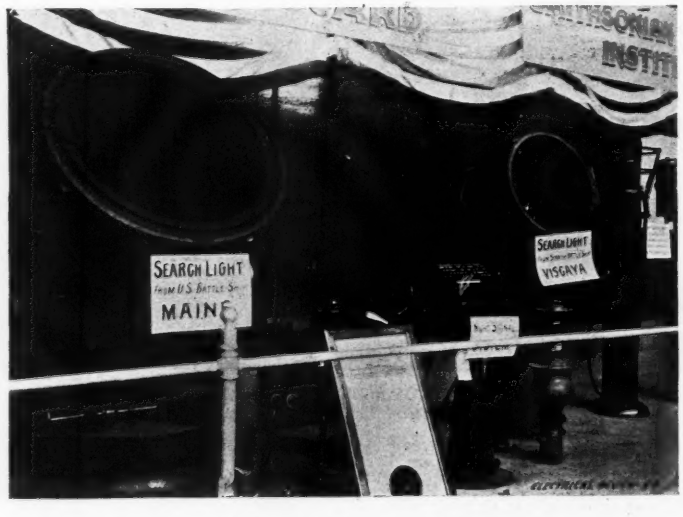
The cloud and lightning photographs, most of which were taken by Mr. Alexander McAdie, of the Weather Bureau in Washington, are among the very finest that have ever been shown, the typical cloud forms being especially handsome pieces of photographic work.

The Smithsonian Institution exhibits a small collection of Prof. Joseph Henry's early experimental apparatus, with which he demonstrated most of the laws of current electricity and magnetism. Among these are batteries, electric bells, lifting magnets and a crude machine which was probably the first electric motor ever constructed. When one looks at the rough appliances with which this eminent man of science accomplished such great results, it gives, perhaps, the best illustration of the advance of electrical knowledge since his day and at the same time can not fail to increase the admiration and respect in which Professor Henry's name should be held by all electricians.

The Lighthouse Board exhibits two Henry electric buoys, such as are used for the lighting of the Gedney Channel in New York Harbor. These buoys are of the spar form, a transformer being attached to the head of the spar, upon which is mounted, in a suitable protecting globe and cage, an electric lamp of large candle-power. Near this exhibit is that of the United States Navy. Two of the historical relics, which are shown in one of the accompanying illustrations, are of deep interest—the searchlights of the ill-fated "Maine" and of the destroyed Spanish protected cruiser "Vizcaya." Here also are shown in working order the various control instruments and truck lights, battle lanterns, diving lamps, battle order indicators, helm-angle indicators, and the Ardois system of night signaling. This was used in our navy throughout the Spanish war. The system is extremely simple, consisting of four double lanterns, each containing a red and a white globe, which are strung up about 10 feet apart on a vertical cord and wired back to a keyboard, something like that of a typewriter. Upon depressing any one of the 50 or 60 keys of this instrument a corresponding grouping of the lights is made, and these are interpreted as letters, numbers and signals according to a code which is, of course, not made public. A handsome exhibit of appliances used in the wiring of ships is also shown, these consisting of conduits, fuse-boxes, cross-over and junction boxes, etc.

A little further along the gallery the Signal Corps of the War Department makes a handsome exhibit of methods of field signaling, including everything from "wig-wag" signals to telegraphs and telephones. There are two signal wagons containing telegraph outfits, a cart with reels of wire adapted to be run out on the ground, a lance-wagon containing the poles for temporary aerial lines, and specimens of old-fashioned apparatus of the same character. The method of running a temporary land line is exceedingly interesting. A corps of nine men, armed with sharp-pointed iron bars, and a surveyor, who locates the line, go along in advance of the lance-wagon and at suitable points drive the iron bars into the ground by sheer force of muscle, thus making holes to receive the butts of the lances. The lance is about 18 feet long, carries a bell shaped insulator at its tip, and a sharp, metal-shod point at its butt. The reel-wagon follows along behind the lance-wagon. The wire is placed in the hooks of the bells and tightened by raising the lances, so that the line is constructed practically as fast as the men can go across country. The wire used for this purpose is of three sorts—plain, galvanized, stranded wire, closely resembling that used for clothes-lines, a similar wire insulated and braided, and the same covered with a copper wire armor. The latter variety is intended to be trailed out on the ground from the wagon, in situations where haste is so urgent that there is no time to erect a line of lances. This armored wire is strong enough to stand trailing over stony ground, and the trampling of men and horses without serious danger of its destruction.

THE ELECTRICAL EXHIBITION.—THE GOVERNMENT LOAN EXHIBIT. WEATHER BUREAU INSTRUMENTS.




THE ELECTRICAL EXHIBITION.—THE GOVERNMENT LOAN EXHIBIT. SEARCHLIGHTS OF THE "MAINE" AND "VIZCAYA."

The wagons containing the terminal equipment for such lines are fitted out with great completeness. They include a repair-kit, folding tables upon which stand relays, sounders and keys; lockers for the batteries, which are of the Daniell type; ground-bars, which are simply sharp-pointed iron bars intended to be driven into the ground near the wagon to make a proper earth connection for the lines, and all the other paraphernalia necessary for hurried telegraphic construction. One of the wagons exhibited was in use on the battle-field of Santiago, and received and sent many messages to and from the firing-line during the siege of that city.

In addition to these electrical signaling methods the Signal Corps also exhibits the ordinary type of mirror heliograph and various forms of night signals burning acetylene and oil. The display is in charge of Major G. W. Stevens, while Sergeant Souder has charge of the telegraph wagons and explains the apparatus to the visitors. Additional interest is lent to the display by the fact that the sergeant was in charge of one of these wagons during the invasion of Cuba and has had practical experience with the telegraphic signals on the battle-field.

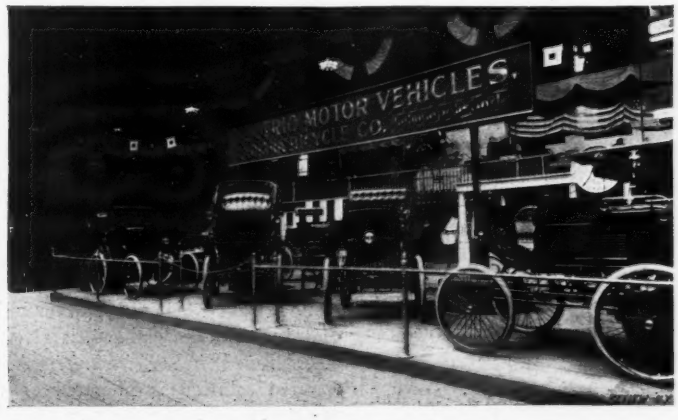
A further exhibit of photographs of the war balloons at Santiago, of hurried line construction, and of the cableship "Hooker" and her outfit (already illustrated in the ELECTRICAL REVIEW), and an improvised switchboard complete the exhibit. This switchboard has a twofold interest, for not only was it used in the Porto Rican expedition, having been mounted in the telegraphic office at Ponce in that island, but it was made on the spot out of strips and pieces cut from a captured copper sugar kettle, and is an illustration of the ingenuity of the American officer in solving emergency problems. It is the handicraft of Colonel Reber, of the United States Army Signal Corps.

## The Show of Automobiles at the Electrical Exhibition.

One of the most interesting features of the Electrical Exhibition is the display of automobile vehicles, no less than four manufacturers showing samples of these conveyances, and some of the exhibits being of great interest.

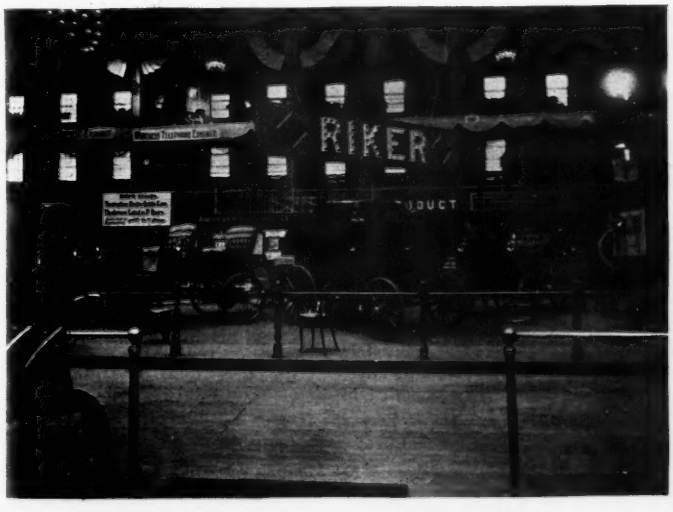
The subject is so important to-day, and seems to be so rapidly growing in the estimation both of electricians and laymen, that the exhibits deserve a somewhat extended notice.

The exhibit of the Indiana Bicycle Company, of Indianapolis, includes six vehicles, of which four are of the type called "runabout." One is a delivery wagon and one is a Stanhope carriage, somewhat after the lines of a Victoria. These samples, less than any others at the show, follow the lines of horse-drawn vehicles. All of them have wire wheels except the delivery wagon, and each is mounted upon running gear of unusual construction. A rectangular frame of steel tubing, forming a double truss, carries the rear axle bearings, the driving mechanism being attached to rear axle. The front wheels are turned for steering and are swivelled at the ends of a double triangular truss forming the forward axle, which is hinged with a pin-joint to the rectangular frame. This arrangement gives the greatest freedom of play to the wheels and permits the vehicle to traverse irregular roads, etc., without throwing any strain upon the frame mechanism itself except that due to the weight of the carriage and its contents. The Stanhope carriage is a vehicle intended either for ordinary pleasure riding or for the use of physicians, etc. It is equipped with an unusually powerful battery, having a capacity of from 40 to 45 miles run under average conditions on level roads. The weight of the machine is 1,350 pounds, of which about 800 pounds is due to the battery. The runabouts weigh only 1,200 pounds, and are equipped with a less powerful battery, giving from 30 to 35 miles capacity on a single charge. These carriages are geared up to speeds of from 3 to 14 miles per hour. The delivery wagon is, of course, expected to run at slower speeds and can only make 12 miles per hour at its maximum.




THE ELECTRICAL EXHIBITION.—THE INDIANA BICYCLE COMPANY'S EXHIBIT.

In all these vehicles a single motor is used, geared by a single reduction gear on the carriages and a double reduction gear on the delivery wagon, to the rear wheels, a differential mechanism being interposed to permit one driving wheel to run ahead of the other in rounding corners. The gear is incased in a dust-proof covering on all of them and runs in oil, a bronze pinion running in a cut-steel counter-gear being used. The batteries with which these vehicles are equipped are made in the company's shops, as are also the motors. It is claimed that they will equal the performance of the best French types of cells, giving very high output for their weight and high and long-continued discharge rate. This may be judged from the fact that the 800 pounds of battery in the Stanhope will propel that vehicle at a speed of eight miles per hour for five hours continuous running. The cells have been tested in service on automobiles since July 1, 1898, and have shown excellent results during that time.




THE ELECTRICAL EXHIBITION.—THE RIKER ELECTRIC MOTOR COMPANY'S EXHIBIT.

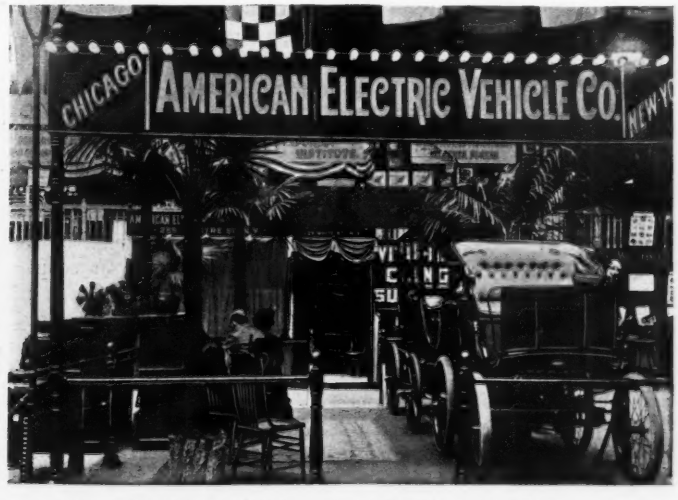
The exhibit is in charge of Messrs. F. M. Hoblitt, R. M. Barwise and the company's electrician, Mr. Robert H. Hassler.

The Riker Electric Motor Company, of Brooklyn, N. Y., exhibits four automobiles, a phæton, a surrey, a brougham and a Victoria. These vehicles differ among themselves very little, except as regards the carriage body and the power of the motors and accumulators with which they are equipped. The frame of the running gear is an irregular quadrilateral of steel tubing, braced at the corners and possessing sufficient flexibility to allow the forward axle about six inches play in a vertical plane. The motor is geared to the rear wheels by a single or double reduction, as the exigencies of the vehicle demand, the gear running in oil in a dust-proof case. A spring suspension, similar to that used for electric street railway motors, attaches the motor to the frame of the vehicle.

Perhaps the most interesting carriage in this exhibit is the special phæton which was designed for the use of the manufacturers and to be handled only by experienced persons. This vehicle is built for speed, containing about 1,000 pounds of accumulators in a total weight of 1,850 pounds. Its four speeds are respectively 4, 12, 24 and 30 miles per hour, the last being, probably, the highest speed yet attained by an electric automobile, and require an experienced driver for its management. The endurance of this vehicle is said to be about 30 miles under normal conditions at an intermediate speed.

The Riker exhibit is in charge of Messrs. Riker and Proctor.

The American Electric Vehicle Company, of Chicago and New York, exhibit two vehicles—a delivery wagon and a runabout buggy. These vehicles are provided with a rectangular steel frame for the running gear, and each carries a single motor geared to the rear axle, the usual "jack-in-the-box" or differential gear being included in the motor shaft. They do not rely upon the flexibility of the frame in encountering uneven road surfaces, but are provided with a pin-joint by which the front axle is connected to the frame, thus permitting considerable vertical play to the front wheel. The carriages are handsomely finished, as will be seen from the accompanying illustration.




THE ELECTRICAL EXHIBITION.—THE AMERICAN ELECTRIC VEHICLE COMPANY'S EXHIBIT.

# SCIENCE BREVITIES.

**Glass Making by Electricity**—An article in *L'Electricien* describes a process due to Herr W. R. Kroll, of Cologne, for using the electric furnace in the manufacture of glass. It is said that excellent results have been obtained. An economy of as much as 60 per cent in coal is claimed, and it is said that the electric furnace heats the ingredients contained in the glass crucible without danger of spoiling the products with particles of coal and cinders. At the same time the heat required for melting the same quantity of glass is much less when it is generated within the crucible itself than when it is applied externally, and the men engaged around the furnace can approach the mass of melted glass without danger of being burned. It is said that a mass of glass requiring 30 hours to melt in the ordinary furnace can be reduced to the liquid state in 15 minutes by the electric furnace. On this account the large pots used in ordinary glass furnaces are unnecessary, and small crucibles of carbon, containing from 40 to 50 pounds of raw materials of glass, are found to be quite satisfactory. Another point of importance is that the work can be commenced or stopped at any time without serious loss, and work on nights, Sundays, etc., is thus rendered unnecessary.

**Daylight Phosphorescence**—In *Comptes Rendus* M. Mourelo states that he has made the curious discovery that sulphides of strontium, calcium, barium and zinc, prepared in a particular way, show much more brilliant phosphorescence after exposure to diffused daylight than they do after exposure to direct sunlight, and, further, that periodic exposure to diffused daylight increases very remarkably the power of phosphorescing. After being brought to this sensitive state one phosphorescing portion is able to excite phosphorescence in another non-luminous portion, either when the two portions are in contact or when they are contained in separate glass tubes.

**Hertz-Wave Absorption**—MM. E. Branly and Gustave LeBon have recently presented to the Académie des Sciences a note concerning some experiments on the absorption of electric waves by non-metallic substances. It has been demonstrated that the smallest opening in an enclosing shell will permit the entrance of electric waves, whereas a metallic envelope less than one one-hundredth-inch thick is sufficient to entirely shut them out from its enclosed space if it be perfectly homogeneous. Experiments were made upon cement, concrete, white marble and sand. It was found that cement blocks up to one foot in thickness were practically opaque to electric waves when wet, but that when they were dry they allowed a certain percentage of the radiation to penetrate them. The marble, when dry, was found to be quite transparent, and when wet considerably less so. Dry sand was found to be practically transparent, and somewhat less so when wet. The conclusions drawn were that the opacity of such substances for electric waves depended upon their nature, their thickness and their moisture, the effect of dampness being always greatly to diminish the transparency.

**A New Form of Coherer**—M. Andrè Blondel has been making experiments to determine the cause of the superiority of the Marconi coherer over other forms, and has himself devised an instrument of this type, which he considers better than any other that has yet appeared. He found that the metal particles must be such as to form on their surface a thin layer of oxide. The thickness of this layer of oxide is of the greatest importance, as the coherer will not work well if it is too thick nor if it is too thin. Marconi has attained success by using mixtures of metals (nickel, silver and mercury), but Blondel finds that a better result may be arrived at by using alloys. The alloy must contain an oxidizable metal and a non-oxidizable metal, the proportions of these being adjusted so as to give the required degree of oxidation. Alloys of silver, with nickel or copper (for instance, American or Swiss nickel coins), give the best results. M. Blondel adds to the glass tube of Marconi a side tube or pocket in which a reserve quantity of filings is kept, so that when the layer of filings between the silver electrodes is fatigued by prolonged use it may be shaken out into the pocket and replaced by fresh filings from the store in the pocket.

**The Sources of Atmospheric Electricity**—M. H. Pellat has been conducting some experiments to investigate the sources of atmospheric electricity. It was formerly supposed that the evaporation of the moisture of the earth's surface was the cause of the electric charge of the atmosphere, but it had not been proved that highly charged water when evaporated lost any of its charge with the vapor. It has been shown that, with a potential of 25,000 volts, the liquid lost some of its charge, but in this case the liquid was pulverized, and was widely removed from the ordinary condition of water. M. Pellat negatively charged to 116 volts water in a very shallow dish, and connected it with a quadrant electrometer, and after an hour's evaporation, it showed a loss of from 40 to 60 per cent. He thinks that the negative charge of the earth must suffer a loss, and the air must gain in negative charge during the first warm hours of the day, and that the reverse process sets in after sunset.

**Amalgamating Battery Plates**—The following formula for amalgamating zinc plates for batteries, and for which good results are claimed, is given in *Elektrotechnische Zeitschrift*. A saturated solution is prepared of the neutral sulphate of mercury, to which a quantity of sulphuric acid is added sufficient to make the solution complete. This is then mixed with oxalic acid until a grayish mass is obtained, having a consistency of cream, and a little sal-ammoniac is then added. The zincs are rubbed briskly with this paste, and if not to be used at once they should be well dried. It is claimed that with this method of amalgamation the zincs resist the acids much better than when the usual method is used.

**The Danger of Acetylene**—In an article by Dr. John B. C. Kershaw, in our London namesake, is given a list of several recent accidents due to acetylene which is deeply interesting. It is as follows:

1. Explosion of acetylene gas at Egremont, in Cheshire, killing the experimenter, who had been using an acetylene gas engine—March, 1897.

2. Explosion of acetylene gas at the carbide works at Prémont, near St. Michel de Maurienne, killing one man, injuring three, and wrecking the works—(Reported in *L'Industrie Electrochemique*, Vol. I., p. 47).

3. Explosion of acetylene gas at Dayton, Ohio, caused by a flood and liberation of the gas from stored carbide—March, 1898.

4. Explosion of acetylene gas at Delaware, while charging a generator. One man killed—December, 1897.

5. Explosion of acetylene gas at Lynn, in Norfolkshire, while charging a generator, killing one and injuring another—December, 1898.

6. Explosion of acetylene gas at Netherseal Colliery, Ashby-de-la-Zouch. Building containing the plant wrecked, and one man killed—January, 1899.

7. Explosion of acetylene gas in laboratory of French war office, during experiments upon use of mixtures of acetylene and compressed inert gases for illuminating purposes. No one seriously injured—March, 1899.

These are all accidents caused by explosions of mixtures of acetylene gas and air; had those resulting from the use of liquid acetylene been included, the number would have been doubled, and the fatalities increased fourfold.

Many forms of acetylene generators which have been brought forward in the last two years are such as to permit the mixture of air with the gas, this generally happening when the carbide is fed into the water in the apparatus. A dangerous explosion due to this gas was noticed in the last number of the ELECTRICAL REVIEW.

## Uranium Rays.

TO THE EDITOR OF ELECTRICAL REVIEW:

SIR: Under heading of Science Brevities, in issue of May 3, your writer there, speaking of uranium rays, says: "There is nothing more curious in the whole range of recent discovery than these rays. Certain substances seem to pour them out in utter defiance of the law of the conservation of energy."

Let me ask, does the law of conservation of energy apply to objects in the material world receiving their properties or powers direct from the hidden source of life? For example, a lump of magnetic iron ore may be placed in the same category as a lump of uranium. Why not? And will not the iron continue to give out its power, its rays, to all eternity, or as long as the planet continues to revolve, unless eaten up by some other metal or gas?

Don't you think there is room for a more extended mental view in this region of physics?

FRANK TRIMBLE.

New York, May 10, 1899.

[There is always room for a larger view, but there is no parallel between the field of force surrounding a magnet and the radiations emanating from uranium. One is simply a strained state of the ether, requiring no continuous expense of energy for its maintenance; the other is a constant outflow of energy, capable of producing effects in external bodies. The source of the energy of uranium radiation is one of the deepest mysteries of modern physics.—ED.]

The Electric Company of America has purchased the Conshohocken, Pa., gas and electric light companies. The gas company's capital stock is $75,000 and the electric light $35,000. It is alleged that the purchasers will erect a large power plant.

## Arc Lighting Rectifiers at the Hammersmith, Eng., Electricity Works.

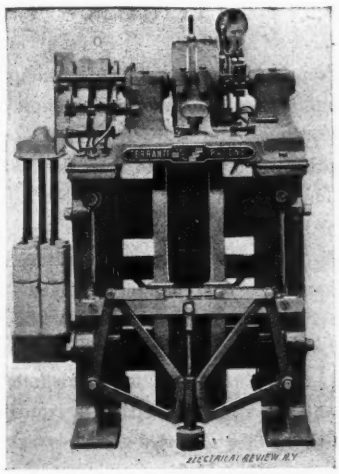
The electricity works of the Hammersmith Vestry, a part of the extended scheme of electric lighting which supplies London, has recently been enlarged, and some interesting machines of the rectifier type added for the purpose of working street arcs. The illustrations herewith, for which we are indebted to our London namesake, show a battery of five rectifiers mounted in position and also one of the machines in greater detail. The main station is of the single-phase alternating type, containing two 300-kilowatt, three 125-kilowatt and one 25-kilowatt units, each consisting of a vertical high-speed steam engine, direct-coupled to an alternator giving 2,300 volts at 50 cycles per second.

It is well known that alternating current of this character is unsuitable for the operation of open arc lamps in series. The rectification method is used at Hammersmith, the machines shown in the illustration turning alternate half waves of the alternating current around, so that the effect is a pulsating current continuous in direction. This variety of current is claimed to have some advantage over a smooth direct current for the operation of arc lamps, because the vibrating character of the impulses given to the lamp machinery prevent the latter from sticking, while for street lighting the slight humming sound given out by the arcs is in no way objectional. The rectifiers consist of a commutator, driven by a synchronous motor and taking current from an open-circuit transformer. This transformer elevates the pressure to 2,500 volts, and is so arranged that by automatic means the length of air-gap in its core can be varied. In this manner a current of constant volume, 10 amperes, can be furnished to the line, the electro-motive force varying with the demand upon the apparatus. Each of the rectifiers drives 50 Brockie-Pell arc lamps in series, two of the five machines being held in reserve, while three furnish with current the 150 arcs operated from this station.

The Hammersmith station is one of the finest of its kind in England, and, although small, shows evidences of careful design. A curious fact about it is that while the maximum load is nearly 600 kilowatts, the day load is generally not more than 50 kilowatts, the reason for this being that this part of London is filled with second-class stores and shops in which very little light is used during the day.

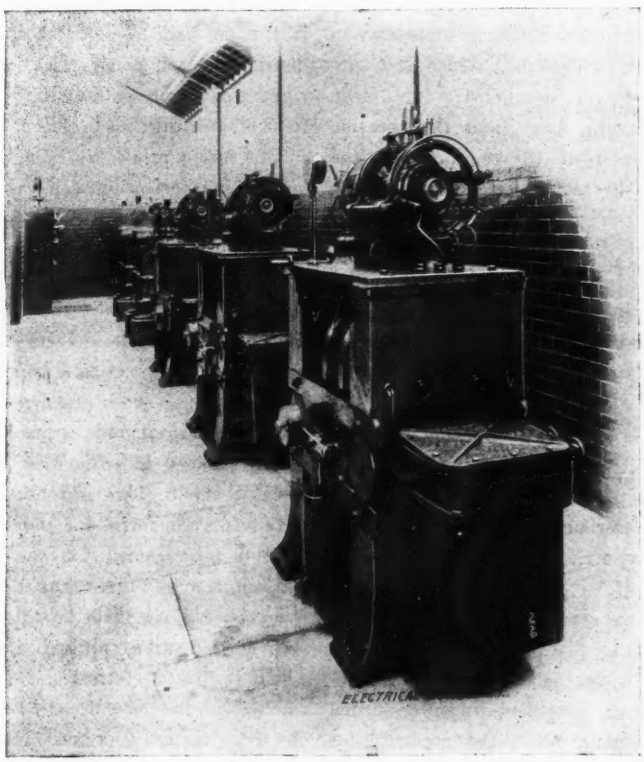
## Tesla Lectures in Chicago.

Mr. Nikola Tesla was entertained by the Commercial Club, of Chicago, on May 13, and in the evening delivered an address before the club. Besides the members, many prominent scientists and educators attended the



ARC LIGHTING RECTIFIERS—THE FERRANTI RECTIFIER.

dinner in his honor, which was an elaborate affair. Mr. Tesla gave a number of interesting demonstrations, one of which was steering a boat from the shore, using a seven-foot model on a miniature lake, built in the banquet-hall for the occasion. His experiments did not begin until nearly midnight and lasted until a late hour.



ARC LIGHTING RECTIFIERS—BATTERY OF RECTIFIERS IN THE HAMMERSMITH (LONDON) STATION.

## Franklin Institute Meetings.

The bulletin for the months of May and June, issued by the Franklin Institute, of Philadelphia, contains announcements of three papers of electrical interest. At a stated meeting of the electrical section on May 23 Mr. James Hamblet will read a paper on "Electric Clocks Historically Considered, etc., and the Uniform Distribution of Time." At the same meeting Mr. J. D. Darling will present a paper on "An Improved Primary Battery." On June 13 there will be a special meeting of the electrical section, at which Mr. B. C. Washington, Jr., will present a paper on "Water-Power Electrical Plants in the United States," illustrated by lantern slides.

## A Modest Request.

TO THE EDITOR OF ELECTRICAL REVIEW.

DEAR SIR: Please send me all the information you can in regard to:

1. Will electricity outplace steam and the horse?
2. The advantages of electricity.
3. The uses of electricity.
4. The discovery of electricity.

Also, all the information, if you have such, you can get about Rome. Find two-cent stamp enclosed for the return. If it costs any more, will pay you. Yours respectfully,

P. S.—Please send as quick as possible.

Wellfleet, Mass., April 24.

## National Electric Light Association.

ARRANGEMENTS FOR THE TWENTY-SECOND CONVENTION NEARING COMPLETION.

The preliminary arrangements for the twenty-second convention of the National Electric Light Association, to be held in New York city, May 23 to 25, inclusive, are rapidly nearing completion. The programme of the papers to be read before the meeting has been published in the ELECTRICAL REVIEW.

The following committees have been appointed by President Young, to serve in connection with the forthcoming meeting: Reception Committee—Thomas E. Murray, chairman, Chas. A. Schieren, H. L. Shippy, C. H. Jackson, L. F. Requa, Geo. T. Manson, J. W. Lieb, Jr., Paul Spencer, E. A. Leslie, E. H. Stevens, William Brock, E. H. Maher, Jr., A. J. Purinton, A. H. Patterson and W. S. Barstow. Entertainment Committee—Chas. W. Price, chairman, W. L. Candee, Theodore Beran, Wm. F. Zimmerman, C. O. Baker, Jr., A. H. Patterson, E. F. Peck.

On May 25, starting at 11 A. M., a special steamboat excursion will take the ladies up the North River as far as Yonkers, to give a view of the Palisades, down through the Narrows, up through Buttermilk Channel and past the Navy Yard, returning in ample time for dinner. Luncheon will be served on the boat.

The following committee has been appointed by President Young to arrange an automobile ride for the ladies of the association, on Wednesday afternoon, May 24, starting from Madison Square Garden at about 3 P. M.: Messrs. E. F. Peck, C. O. Baker, Jr., A. H. Patterson, T. C. Martin, H. L. Shippy, J. W. Godfrey, Frederick Vieweg, and Prof. G. F. Sever. The route will include Fifth avenue, Riverside drive, Grant's tomb, etc. The party has been invited to visit Columbia University and take afternoon tea in the West Hall, as well as to inspect the library, with its unique scheme of lighting, the engineering buildings and the mechanical plant. On the return ride, the New York Electric Transportation Company has invited the party to visit its "stables" and see how automobiles are furnished with their motive power, how the batteries are charged, etc.

Other forms of diversion, to be announced later, have been provided by the entertainment committee, with special reference to the amusement of the ladies.

# Electrical Review

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News, Subscriptions and Advertisements.

**SPECIAL NOTICE TO ADVERTISERS.**

CHANGES for advertisements must be in this office by Friday noon for the following week's issue.
NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week, although it is occasionally possible to get in matter received on Monday.

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## *ELECTRICITY AND THE IDEAL CITY.*

The ideal city long has been the dream of the civic reformer. To-day the advance in the electric arts has made the perfection of municipal conditions far less impossible than the most hardy would have dreamed it to be a decade ago.

Perhaps the three most essential elements of a community fulfilling the ideal conditions will be prompt transit from part to part, freedom from dirt of all kinds, and quiet. It seems to-day almost hopeless to consider the latter as a possible characteristic even of the most advanced community, but the fact is that we are nearer suppressing unnecessary noises to-day than ever before. Any one who will analyze the mingled sounds that constitute the uproar of a great city will find that probably nine-tenths are due, directly or indirectly, to the presence among us of the horse. He, also, is responsible for practically all of the dirt of our cities, and, singularly enough, for all of the flies, which are such an annoyance in the warm season. Hence the suppression of the horse would mean cleanliness, quiet, and that beatific condition of things in which the house-fly would be as rare as the robin.

This may at first sound a little far-fetched, but it must be remembered that the greater part of the noise of a city is due to the roar of wheel-traffic over stone-paved streets. Similarly, far the greater part of the dirt of city streets is due to the working up of the subsoil through the interstices of stone pavements, to the grinding of the latter under the wheels of heavy trucks, etc., and directly to the horse himself.

In an era where the horse is relegated to his proper environment—that is, to the country—and all vehicles are propelled by power in one form or another, the necessity for stone pavements will disappear. Our streets can be covered with an impervious layer of asphalt, through which no earth can work up to form mud in wet weather and dust in dry seasons. The familiar pounding of hoofs and roar of wheels over stone streets will have become an unpleasant memory, and our cities—lighted by electricity, clean because never allowed to become unclean, quiet because of the absence of most of the noise-making anachronisms surviving to-day—will become almost ideal places of residence. It is not an idle dream to look forward to municipal conditions which shall combine quiet, cleanliness and safety. The contribution of electricity to these desirable ends, through the suppression of the car-horse, has been so notable that it has not escaped the observation of any citizen old enough to remember the period of horse traction. The movement for the utter suppression of the horse, and his banishment from the streets of cities, is growing with accelerated speed; it is perfectly reasonable to believe that most of those who read this paragraph will live to see the day when a horse will be an object of surprise and remark upon the streets of our better-class cities. When one seriously thinks of it, it is not hard to see that this filth-distributing and noisy animal has no right whatever to pollute the habitations of men with his presence.

This happy result can be achieved only by the perfection of the electric automobile. It has been attempted to operate automobiles for urban purposes by means of oil motors; but these machines have two serious and insurmountable defects which have made them practically impossible for the purpose—noise and evil odors. The electric automobile is practically noiseless and entirely free from objectionable smell. The last five years have seen a wonderful and rapidly increasing improvement in these vehicles, and it is safe to say that the next five years will see them brought to a state of perfection approaching that which the electric street railway has reached in the past decade. When one considers the enormous civilizing power of quiet and cleanliness in cities, it will be seen that in this direction electricity is rapidly doing one of its most substantial works for the betterment of social conditions and for the increased happiness of the race.

## *THE NATIONAL ELECTRIC LIGHT ASSOCIATION'S CONVENTION.*

On May 23 the National Electric Light Association will meet in New York for its twenty-second annual convention. The yearly gatherings of this most representative body of electrical men have been growing in value and significance to the profession, until they are now events of marked importance. Papers on subjects of vital interest are often held by their authors for presentation at these meetings, and the eminently practical discussions, either following papers or upon topical subjects, frequently bring to light matters of the deepest interest to the working electrician.

This year the programme is unusually interesting, and the attendance promises to be large. The fact that the meetings are to be held at the electrical exhibition will add greatly to the attractiveness of the convention, though there is little need to increase the "drawing power" of a gathering that annually attracts several hundred men from different sections of the country.

New York is preeminently a convention city. There is more here to interest electrical men than in any other city in the United States. It is with the greatest pleasure that the ELECTRICAL REVIEW welcomes the association and its members to the metropolis, and wishes them the utmost enjoyment and benefit from the convention.

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A boiler insurance company in England has added the insurance of dynamos, motors, etc., to its other business. The plan is certainly a good one, as it secures the owner of an isolated plant, for example, a competent inspection at regular intervals and reimbursement in case of damages. Why should not this scheme be worth the attention of some of our American boiler insurance companies?

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Our name contest is progressing beyond the expectations of its originators. Names for "electrically operated, self-contained vehicles for roads and streets" are coming in every mail. The more the better. The contest is free to all, and all are invited to participate.

## THE LIQUID INTERRUPTER.

A FURTHER DISCUSSION OF THIS INTERESTING INSTRUMENT BY PROF. ELIHU THOMSON, E. W. CALDWELL AND OTHERS.

The liquid interrupter for rapidly breaking an inductive circuit, such as the primary of an induction coil, described by Mr. E. W. Caldwell in our issue of May 3, has attracted no little attention. Writing under dates of May 7 and 11 Prof. Elihu Thomson says, in part:

"The sudden closing of the circuit appears to me to be due to the almost instantaneous condensation of the vapor. Then the current ceases. The electrostatic pressure can only be feeble, I think, as compared with other forces. The noise made by steam sent from a steam-pipe into water is due to the same cause. A bubble of steam leaves the end of the pipe and instantly collapses by condensation, and so on. The liquid in the interrupter is really exploded and moves too far at the interruption, with the result of a partial vacuum being formed or left when the current ceases, and the liquid then closes into the gap with a sudden shock, due to its inertia or momentum, upon collapse of the vapor or vacuous space."

Replying to a letter which stated that, on account of the interrupter working better when the liquid becomes hot, and the bubbles projected from the orifice in the separating partition failing to collapse, this theory of condensation seems insufficient, Professor Thomson writes:

Your letter of May 10 interests me very much. I do not think it necessary to assume that the collapse of the liquid or the vapor globule will occur directly in the opening. I should expect the violence of the action to be such as to project the liquid through the opening, depending on the form of the orifice, the inertia of the different liquid columns, etc. It may even be that the electric action at the two sides of the interruption has such a powerful effect on the surface tension as to cause the propulsive action, on somewhat the same principle as that which is used in the Lippman capillary electrometer.

I have not had time to do any further experimenting in this direction, and I would ask whether, in your experiments, the bubble which you speak of actually disappears and condenses, or whether it rises to the surface of the liquid?

If it condenses, it would appear to be steam, unless its condensation is accompanied by a flash of light, in which case it would be oxygen and hydrogen uniting. If, however, any portion of the bubble rises to the surface, it would indicate disassociation or decomposition of some of the liquid at the time of the interruption and the escape of the separate gases.

The fact that the interrupter works when hot may be (and it appears to me to be) due to the greater ease at which the liquid is vaporized, or to the lessened energy required to accomplish the vaporization. The connection would, of course, be sudden enough, even in this case, if the bubble of steam formed is projected out of the opening and its place taken by a column of liquid. Anything which, in fact, removes the column of bubble or gas suddenly from the opening must, it seems to me, take the place of a condensation or collapse.

The whole subject is, undoubtedly, of great interest and value.

Yours very truly,

ELIHU THOMSON.

The subjoined communication from Mr. Caldwell describes certain further phenomena of the interrupter and partly answers Professor Thomson's questions:

TO THE EDITOR OF ELECTRICAL REVIEW:

I have read with much interest the able criticisms which appeared in the ELECTRICAL REVIEW for May 10 upon the liquid interrupter described in the issue of May 3. My experiments with this interrupter are not yet complete enough to warrant me in formulating a complete theory of the instrument.

That the essential action of the instrument is thermal there seems to be no doubt. The quickness of the break seems to be satisfactorily accounted for, as Professor Thomson suggests, by the rapidly diminishing cross-section of the portion of the liquid conductor in the orifice in the separating partition, and by the action of the inductance which tends to keep up the strength of the current.

Mr. Goldstein's theory as to the action of the polarization cell is apparently not based upon a trial of the instrument, and is not sustained by experiments. With an electrolyte of dilute sulphuric acid, the interrupter works equally well with electrodes of lead, carbon, zinc, copper or iron, or with any two of these metals. With an electrolyte of saturated solution of sulphate of copper, and electrodes of electrolytically deposited copper, the interruption takes place with apparently the same sharpness of break as when using sulphuric acid. The energy of the secondary spark is much less when using sulphate of copper solution, but this is due probably to the fact that the specific resistance of the sulphate of copper is much higher than that of sulphuric acid. This is proven by the fact that an efficient mechanical interrupter, in series with the sulphate of copper liquid interrupter, does not produce markedly better results in the secondary than are obtained by the action of the liquid interrupter alone. I am, therefore, inclined to think that Mr. Goldstein has attached undue importance to the polarization of the cell, and has overlooked the fact that a solution of sulphate of copper has higher specific resistance, higher specific heat, and higher boiling point than the sulphuric acid solution. The addition of a little sulphuric acid to the copper solution, increasing its conductivity while not affecting the polarization of the cell, greatly improves the action of the interrupter.

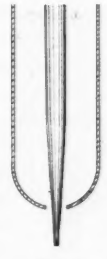
It is difficult to account for the rapidity with which the make succeeding the break takes place. It seems impossible that the action of gravity alone would remove the bubbles of vapor fast enough. That condensation plays no important part in it is proven by the fact that the instrument works more efficiently as the temperature increases up to a point very near the boiling point of the liquid. Indeed, the interruptions take place while the liquid is being boiled violently by the application of heat from a Bunsen burner, but the bubbles of steam rising from the bottom of the receptacle interfere to some extent with the closing of the circuit in the orifice of the partition. I am inclined to think that the electrostatic pressure helps to bring the two portions of liquid into contact, as suggested by Mr. Child, but I am as yet unable to judge from my experiments how much importance to attach to this action. The action of this interrupter is seen from the foregoing to be in most respects different from that of the Wehnelt instrument.

I have noticed that the edges of the orifice in the glass partition become whitened, apparently by oxidation, after the interrupter has been in use for some time. This would indicate that the liquid is decomposed into its component gases in the orifice. It would be interesting to know whether this decomposition is due to the excessively high temperature and what part electrolysis plays in it.

Another curious thing that has been noted is that, under certain conditions, which have not yet been definitely determined, the level of the liquid in the test-tube form of the interrupter rises sometimes two or three inches higher in the test-tube than in the larger vessel.

The efficiency of the instrument seems to vary considerably with the amount of inductance in the circuit. With a certain induction coil, having about 1,000 turns in the primary and using 110 volts, the liquid interrupter is fully as efficient as a very good mechanical interrupter. That is to say, the coil works perfectly well when the liquid interrupter is substituted for the mechanical interrupter, and no change is made in the rheostat in series with the coil and interrupter. With coils having a very short primary winding and low inductance, the effects are not nearly so satisfactory.

The losses of energy in the interrupter are due to the electrolytic separation, to the heat loss due to the resistance of the interrupter, and to the work necessary to vaporize the portion of the liquid in the orifice. I am inclined to think that most of the loss of energy is due to the work required to vaporize that portion of the liquid in which the break takes place. As the temperature of the liquid is increased its resistance is diminished and also the amount of heat necessary for vaporization. This probably accounts for the fact that the instrument works better when the liquid is at a moderately high temperature. It will be obvious that the best efficiency will be obtained in an instrument in which only a small quantity of liquid must be vaporized at each break, and in which the specific heat, the heat of vaporization and the boiling point of the liquid are low.



LIQUID INTERRUPTER WITH VARIABLE ORIFICE.

A convenient form of the instrument is shown in the accompanying figure. The orifice at the bottom of the test tube is made large, and the area of its cross-section can be varied by inserting, to a greater or less extent, a cone-shaped rod of glass. With an interrupter made in this way I have been able to vary the rapidity of interruption from about 10 breaks per second to about 300 to 400 per second by changing the position of the glass cone in the orifice.

E. W. CALDWELL.

New York, May 15.

## ELECTRICAL NEWS FROM PARIS.

NEW UNDERGROUND ROAD—DUCRETET'S WIRELESS TELEGRAPHY—ELECTRIC CAB SERVICE.

The metropolitan underground electric road now in construction will be the first system of the kind in Paris. Its length is to be 14 kilometres, and it passes in nearly a straight line across the city, east and west, from the Porte de Vincennes to the Porte Maillet. Work on this road is now progressing rapidly; it has been divided into 11 sections, each of which has a portable electric outfit to provide the necessary lighting. For the construction of the tunnel it was at first decided to employ a metallic tube similar to the underground road of London, but this project has been abandoned, and a hemispherical tunnel of masonry will be used. At the portions of the tunnel which pass near the surface of the street the latter will be supported by a construction of heavy iron cross-beams and brick arches. There will be 22 underground stations along the route, roofed with iron construction or masonry vaulting. It is expected that the road will be completed before the opening of the exposition.

The contract has been given to Schneider et Cie, of Crensot, France, for the construction of an installation consisting of three direct-driven machines of 1,500 kilowatts each, which are necessary for the operation of the road. One of these machines will furnish continuous current of 600 volts for the portion nearest the central station, the two others being triphase alternators at 5,000 volts, feeding a substation near the Arc de Triomphe. There eight transformers and three rotary converters will effect the transformation into continuous current at 600 volts. The rolling stock is to be furnished by the Societé de Construction du Nord de la France, and the Franco-Belgian Company. It will consist of 46 motor cars and 115 trailers, arranged for first, second and third-class passengers. Each car will be equipped with two Westinghouse motors of 100 horse-power each; these will be constructed at the company's new works at Havre. The rails are the heaviest yet employed in France, weighing 100 pounds per yard; these are furnished by the Societé des Forges de Trognac. The ties are of creosoted Pyrenees maple, and about 40,000 will be used. For the lighting of the tunnel and stations 73,000 metres of wire of different sizes are needed. It is expected that the road will be completed by March 1 of next year.

The experiments of M. Ducretet in the field of wireless telegraphy are attracting considerable attention. The problem of transmitting the waves across the city is somewhat difficult, owing to obstacles such as high buildings, smoke, metallic roofs, etc., and for this reason the distances covered are necessarily less than those attained by Marconi. The latest experiment made has been the transmission of messages from the center of the city to the suburb of Villejuif, five and one-half kilometres distant. On the first trials the results obtained were not satisfactory on account of the obstruction caused by the numerous factories in that part of Paris. The receiving wire was supported on a high mast placed on the roof of M. Ducretet's laboratory, and passing down to the receiver below. It was found that upon placing the instruments upon the roof of the building the messages were received in a very satisfactory manner, the length of wire from the top of the mast to the roof being about 28 metres. The French Government has taken up the matter, and the Minister of the Marine was present at the experiments recently made by Lieutenant Tissot and M. Ducretet on the coast of Brittany between two cruisers, the results of which were excellent. The War Department is to have tests made at Nancy, under the supervision of the general of the 20th Corps, as the new system promises to be of service in military maneuvers.

The Compagnie Générale des Voitures has lately organized an electric cab service, commencing with 100 cabs, which are already in operation. The company has secured 40,000 square metres of ground near the city, upon which a charging plant has been erected, comprising two generators of 250 horse-power, which distribute current to 160 charging stations in the city and suburbs. The company has also organized a training school for conductors (drivers), with an experimental track arranged so as to present the conditions and difficulties of real service; 200 drivers have been already trained in this manner. The cabs accommodate four persons, and are arranged so that the top part is interchangeable for Summer and Winter service. The motors are geared to the rear wheels. The controller is under the seat of the driver, and gives four different speeds, 3, 6, 14 and 17 kilometres per hour, and also operates the two electric brakes. The accumulators are furnished by the societi pour le travail electrique des metaux, and consist of 44 elements, whose capacity is 135 ampere hours. The positive plates of this battery are of the Planté type and the negatives of reduced lead chloride. The case containing the battery is suspended to the truck under the body of the cab by four chains attached to spiral springs, which, with the flat springs of the truck, give it a double suspension, thus avoiding shocks, and permitting of an easy replacement of the battery. The weight upon the axles is estimated as follows: weight of cab body, 1,200 kilogrammes; driver, 70 kilogrammes; accumulators, 750 kilogrammes; weight of four persons, 280 kilogrammes; giving a total of 2,300 kilogrammes, of which 800 kilogrammes is upon the front and 1,500 upon the rear axle. If the results obtained with the first 100 cabs prove satisfactory this number will be increased to 1,000 and the generating station enlarged accordingly.

Besides the numerous electric railways to be constructed shortly in the city of Paris and suburbs, the following cities and towns are to have electric roads: Between Limoges and Aixe, a line of 12 kilometres; the town of Epinal, Orleans, Portiers, Vaulx-en Velin, near Lyons; Valence to Saint-Peray, Montelimar to Lafarge. These roads are in course of construction or will be commenced in the near future. J. P. C.

Paris, April 29.

## PERSONAL.

Governor Atkinson, of Georgia, president of the Georgia Electric Light Company, of Atlanta, was in New York city last week.

Mr. Chas. E. Wilson, manager of the Philadelphia office of the Siemens & Halske Company, of Chicago, was a Chicago visitor last week.

Mr. J. E. Talbot, formerly of the Fort Wayne Electric Company, and who is well known in electrical circles, has been appointed master electrician at the Charlestown, Mass., Navy Yard.

Mr. Charles A. Moore, of New York, the eminent machinery builder, purchased last week the entire shops of the Armington & Sims Engine Company at Providence. Mr. Moore is at the head of probably the largest machinery interests in this country under one management.

Dr. Louis Bell, of Newton Centre, Mass., will soon be located in New York. He is at present interested in an ingenious machine of his invention for the cooling of houses. The principle of the latent heat of evaporation of water is utilized, an electric motor furnishing the necessary power. His numerous friends in this city will be glad to welcome Dr. Bell upon his return to active work here.

Col. John N. Partridge, State Superintendent of Public Works, extended the courtesies of his office at Albany and a very agreeable luncheon at the Fort Orange Club to a committee of electrical visitors recently, who called to make arrangements with Governor Roosevelt for the opening of the Electrical Exhibition. Colonel Partridge, as a former electric railway president, vouched for the electrical committee, and they were very courteously and pleasantly received by Governor Roosevelt. Adjutant-General Andrews was also present at the interview and appeared on the side of the visitors. The committee was composed of Messrs. A. M. Young, C. O. Baker, Jr., T. C. Martin and Chas. W. Price.

Mr. H. I. Pettingill, New England superintendent of the Postal Telegraph-Cable Company, has been appointed vice-president of the subcompanies operated under the Erie Telephone system. Mr. Pettingill will assist the president in carrying out the policy of the management, and, while his headquarters will be at Lowell, he will spend considerable time in the company's territory. Mr. Pettingill held the superintendent's position for New England in the Bankers and Merchants' Telegraph Company and the United Lines Company for four years, and for the Postal Telegraph-Cable Company for 12 years. He will assume his new position about June 1.

Mr. George T. Manson gave a very enjoyable luncheon, ride and dinner in honor of the visit of Mr. C. E. Trump, the well known electrical gentleman of Philadelphia, on Wednesday of last week. The party consisted of 10 electricians of various distinctions, who enjoyed a very pleasant luncheon at Mr. Manson's home in Montclair and an afternoon ride over and around the beautiful Orange Mountains and through Llewellyn Park. In the evening dinner was served at the Orange Country Club. The occasion was one of quiet enjoyment throughout and was a great rest to the electrical gentlemen who were thus privileged to be away for half a day from the smoke, turmoil and labor of city life. Those present were J. J. Carty, W. L. Candee, E. C. Bradley, Frank C. Mason, H. D. Cheever, E. F. Peck, Fred Holmes, Chas. W. Price, Mr. Manson and Mr. Trump.

## Lord Kelvin's Genius.

[*Professor Oliver Lodge in the Liverpool Post.*]

The modern theory of electricity, developed so brilliantly by Clerk Maxwell, was begun by him (Lord Kelvin). The science of thermo-dynamics owes much to him; the theoretical laws of thermo-electricity were wholly worked out by him; and to him long ago is due the theory of those electric oscillations which were elaborated practically by Hertz, and have recently been exciting some popular interest as affording a method of wireless telegraphy.

In the higher regions of optics also he has worked much, and in his Baltimore lectures and elsewhere has striven to unveil the mystery of the connection between ether and matter, as revealed in the facts of radiation, fluorescence, phosphorescence, selective absorption and dispersion. The definition and the experimental determination of the absolute zero of temperature are both due to him. The vortex theory of matter constitutes one of his most brilliant but incompletely worked-out speculations. The kinetic theory of its elasticity and rigidity is a definite contribution to that view of the physical universe which seeks to resolve the whole of merely material existence into the two fundamental entitles—ether and motion. Let any one ask what is the size of an atom, and he is referred to Lord Kelvin.

Let him ask what is the age of the earth, and if he mean anything definite by this question—if he mean, for instance, what time has elapsed since the earth was a molten mass beginning to cool—it is again to Lord Kelvin that he must go. And then the tides; all the higher mathematical work on the tides, with their various causes and perturbations, is based on Kelvin's pioneering work, and to him all writers on this abstruse subject look up and defer as their master.

Happy in the circumstances of his education, pertinacious in his unwearying industry, and undistracted by other interests from a constant devotion to definite dynamical science, narrow perhaps in some of its aspects, but all the more intense for that, he stands before us now a monument of human power and influence, one of the benefactors of the human species, one who has been happily preserved with hardly diminished energy for nearly 60 years of peaceful epoch-making work, one on whom posterity will heap high honors, and will regard with feelings of envy us of the present generation who are still illuminated by his living presence.

## Gen. Fred Funston and Electrician Caldwell.

Contrary to general report, the hair of young General Funston is not red, nor even auburn. It is brown. The item first appeared in a New York paper, and probably the cause of it was the fact that Funston used to be about New York a great deal in company with Charles Gleed and E. W. Caldwell, the well known electrician, formerly of the Kansas University. Mr. Caldwell's hair is red, and most likely some newspaper man who was introduced by Gleed to both Caldwell and Funston remembered Caldwell's hair and in due time attached it to Funston's head.—*New York Commercial Advertiser.*

[Mr. E. W. Caldwell, the gentleman referred to above, is the inventor of the liquid interrupter recently described in the ELECTRICAL REVIEW—ED.]

## New Types of Electric Motors.

The illustrations show two types of motors adapted for use in heavy work where great accuracy of control is desirable. Fig. 1 shows a type provided with a brake, kept in operation by the spring at the left and released by the solenoid at the right when the current is passing. In this form of motor turning off the current brings the machine to an instant stop. As this type is iron-clad, and completely enclosed, it is intended rather for intermittent work than for continuous operation, as ventilation is difficult in motors completely incased. Eight of these machines were recently installed to operate the ammunition hoists of the new Japanese crusier "Kasagi." The motors, which are called "Mill-type motors," are built for the usual direct-current voltages, series wound with a small shunt coil to prevent "running away" when the load is removed, and in sizes of 6, 14 and 22 horse-power.

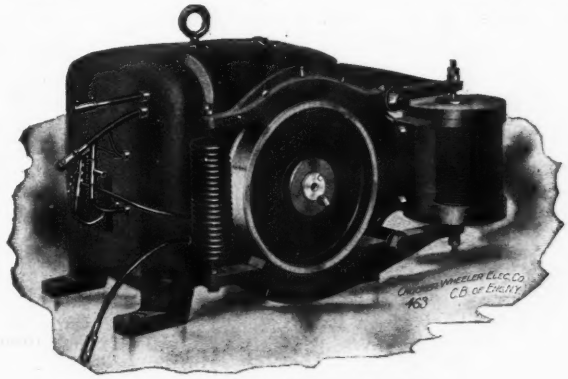



FIG 1.—MILL-TYPE MOTOR WITH BRAKE.

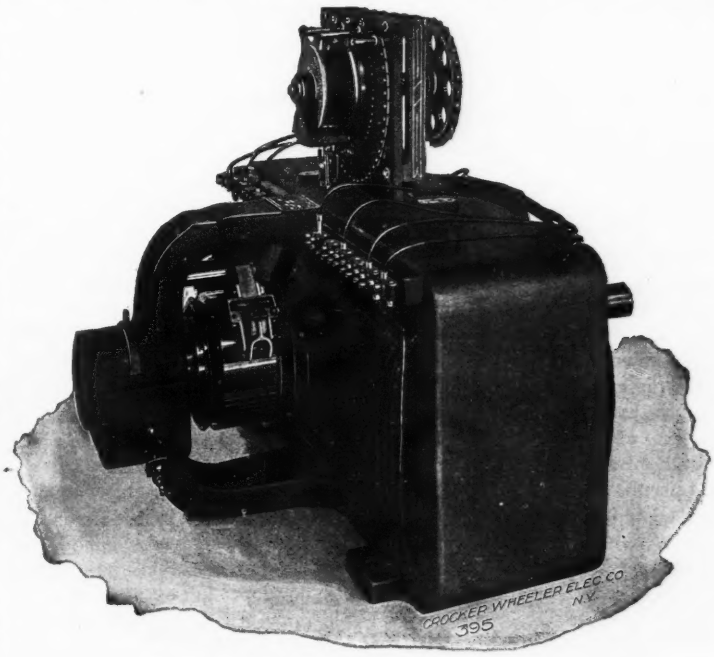



FIG. 2.—ELEVATOR MOTOR WITH STARTING SWITCH.

Fig. 2 shows an elevator motor, or one adapted for frequent starting, stopping and reversing under full or partial loads. The magnet frame is of box form, and large enough to contain additional coil sections for use in starting. The illustration shows the starting switch, which can be put in any convenient place, mounted on top of the motor. By avoiding a sudden inrush of current at starting this motor produces no great disturbance in the circuit when worked in connection with incandescent lamps.

These types of motors are manufactured by the Crocker-Wheeler Company in their factory at Ampere, N. J.

## A Dinner to Electrical Men at the Union League Club, New York.

Mr. A. M. Young, president of the National Electric Light Association, gave a dinner to the local committees of that association and to the officers and committeemen of the Electrical Exhibition Company, at the Union League Club, Wednesday evening of last week. The large private dining-room of the club was used, and some 40 gentlemen were present. The affair was a thoroughly delightful one, and, while informal throughout, a number of very interesting little speeches were made, of a reminiscent as well as prophetic nature. The floral decorations were particularly handsome, and the menu the best this famous and exclusive club could provide. It was an opportunity for the several electrical gentlemen to become better acquainted that they most heartily utilized. Among those present at the dinner were C. O. Baker, Jr., R. A. C. Smith, H. L. Shippy, Prof. W. S. Franklin, L. F. Requa, A. H. Patterson, Geo. F. Porter, H. H. Harrison, Luther Stieringer, T. C. Martin, Herbert Laws Webb, E. F. Peck, Ira W. Henry, C. W. Rice, Chas. W. Price, J. W. Lieb, Jr., Paul Spencer, E. A. Leslie, E. H. Stevens, E. A. Maher, Jr., A. J. Purinton, W. S. Barstow, Thos. E. Murray, Theo. Beran, Wm. F. Zimmerman, H. M. Atkinson, W. H. Meadowcroft, J. W. Godfrey, Chas. T. Hughes, Chas. H. Werner, Geo. G. Blakeslee and W. G. Bushnell.

Mr. William W. Borman, of the well known electrical house of Robert W. Blackwell, of London, is visiting the United States on business. He will be here about six months, and will make his headquarters in New York city.

### American Society of Mechanical Engineers.

This society held its annual meeting in Washington, D. C., last week. The opening session took the form of an informal reception on the evening of May 9 in the new Corcoran Art Gallery. About 500 members were present at the meeting. Among the papers read were those by J. B. Stanwood, of Cincinnati, on "Standards for Direct-Connected Generating Sets;" by R. S. Hale, on "Boiler and Furnace Efficiency;" by Gus C. Henning, of New York, on "Boiler Explosions," and by F. L. Emory, of Morgantown, W. Va., on "Test of a Steam Separator."

At the meeting on the evening of the 10th the following papers were read and discussed: By F. L. Emory, "Relation Between Initial Tension and Power Transmitted by a Belt;" by C. L. Newcomb, "Experiments on Various Types of Fire Hydrants;" by G. W. Bissell, "Experiences with Deep-Well Pumping-Rods;" by A. F. Nagle, "Pipe Flanges and Their Bolts;" by George R. Henderson, "Manufacture of Car Wheels."

A resolution was adopted providing for the use of the term "unit of evaporation." The society also resolved to request the appointment of a committee from the American Institute of Electrical Engineers to cooperate with a committee from the Mechanical Engineers to determine upon and recommend a standard series of capacities, speeds and necessary dimensions for electrical generators for direct connection to steam engines.

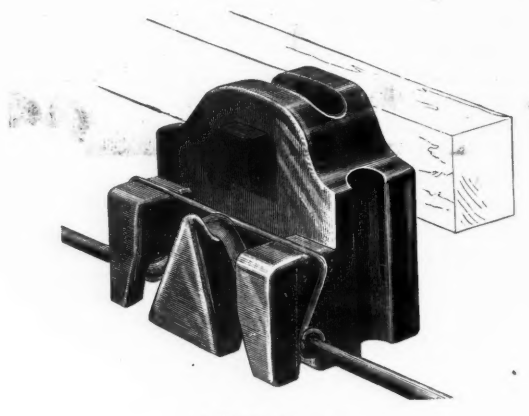
The session on May 11 was occupied by the reading of two papers—"The Equipment of Tall Office Buildings in New York City," by Reginald Pelham Bolton, of New York, and "Rolling Mill Flywheels," by John Fitz, chief engineer and general superintendent of the Bethlehem, Pa., Iron Works.

The last day's session was very interesting. A paper was presented by Prof. Storm Bull on the central heating plant of the University of Wisconsin. In the discussion which followed, William Kent suggested a central station for the Brooklyn Navy Yard, and in all cases where steam is to be distributed within a radius of one mile. This subject is receiving the attention of the naval engineers.

E. A. Darling, of New York, read an interesting paper on the power plant of a university, in which he advocated the use of anthracite coal. George L. Alden, of Worcester, Mass., treated of the "plunger elevator." Charles B. Pratt, of Montclair, N. J., gave a historical sketch of elevators. C. H. Quereau, of Denver, Colo., read a paper on the Allen valve for locomotives, and F. W. Gordon, of Philadelphia, one on a new system of valves for steam engines, air engines and compressors. The society visited Mount Vernon in the afternoon.

### A Novel Insulator.

To provide a device which will serve both as an insulator and as a bracket for sustaining a wire, and which is adapted both to exterior and interior wiring, is the purpose of the invention illustrated herewith. The insulator, it will be observed, has a body portion eccentrically pivoted so that it can swing. The lower and heavier portion of the body is provided with three studs separated by grooves. Of these three studs, the central one is triangular in shape and is undercut to form an overhanging end. The two remaining studs are also provided with overhanging ends. In placing a heavy wire on the insulator, the body-portion may be rocked, and the wires laid in one of the grooves. By rocking the body-portion to the opposite side, the wire may be laid in the other groove and on the triangular central stud. In this manner the heaviest wire may be bent upon the insulator with ease. If it be so desired, the wire may be further secured in place by a fastening, as shown in the illustration; but the use of such a fastening is not always necessary. By mounting the body portion so that it can rock, the insulator is enabled to yield to the sag of the wire and is not readily jarred or broken. The insulator has been patented by the inventors, Wilton S. Bloes and Martin Harloe, of Peckville, Pa.



A NOVEL INSULATOR.

### Volta Night at the Electrical Exhibition.

On the evening of May 13 a meeting of the New York Electrical Society was held at Madison Square Garden, where the Electrical Exhibition is now going on, to celebrate the centennial of the discovery of the electric battery by Alessandro Volta. After some introductory remarks by Mr. Gano S. Dunn, the president of the society, the following letter from Mr. Edison was read:

NEW YORK, May 11, 1899.

GANO S. DUNN, ESQ.,
President New York Electrical Society.

DEAR MR. DUNN: I am in receipt of your kind invitation to attend the Volta Centennial exercises at the Electrical Exhibition in Madison Square Garden on Saturday, May 13, and regret my inability to be with you on that interesting occasion. I need hardly say that I am warmly in sympathy with the sentiment which prompts your society to pay this tribute to the memory of the great Italian to whose investigations and researches in electricity the world owes so much. The discovery of the primary battery, or voltaic cell, was one of the monumental landmarks in the advance of electrical science and application. During the memorable 50 years of the development of land and sea telegraphy it was the one source of current. Without it the modern telegraph would not have existed, and without it the next vital step in the discovery of electro-magnetic induction could not have been made by Henry and Faraday, giving us in turn the later electrical arts that are based upon the dynamo. And even to-day, cells of the general voltaic type remain the most simple, perfect and reliable instruments for electrical measurement that we possess.

I am glad to learn that your Society is to send fraternal messages to the Italian electrical bodies and to the official Telegraphic Congress convening at Como, the birthplace of both Volta and the voltaic cell, and I would beg that I may be allowed the honor of associating myself with you in these expressions of cordial and hearty goodwill toward the countrymen of one of the noblest pioneers of our electrical art. Believe me, yours very truly,

THOMAS A. EDISON.

A telegram from Prof. Elihu Thomson was also read, stating that he regretted his inability to be present at the celebration, but that he sent his best wishes for the success of the occasion.

Mr. Frank W. Jones gave some account of what had been done by telegraphers in this country.

The interchange of courtesies with the Italian Electrotechnical Association was very interesting. The Italian Government was represented by Cav. G. Branchi. Mr. Torcho, a member of the American Institute of Electrical Engineers, and Mr. John W. Lieb, Jr., the man who established the first central station in Europe at Milan,* expressed the sentiments of American electricians in the Italian language. The following messages were then cabled abroad:

TO THE ASSOCIAZIONE ELETTROTECNICA ITALIANO, SEDE CENTRALE, VIA S. PAOLO 10, MILANO, ITALY:

Electricians of America, through the New York Electrical Society, meeting at the Electrical Exhibition in New York on the centennial of Volta's memorable discovery of the electric battery, extend to their brethren in Italy congratulations on the great century of development that has followed the results due to Italian skill and science.

TO THE PRESIDENT, VOLTA ELECTRICAL EXHIBITION, COMO, ITALY:

The Electrical Exhibition in New York city offers, through the New York Electrical Society to the Electrical Exhibition at Como, celebrating Volta's memorable invention of the electric battery, heartiest wishes for its success and for the success of the telegraphic conference.

TO THE ITALIAN PREMIER, PRESIDENTE CONSIGLIO, ROME:

The electricians of America, celebrating the Volta Centennial in New York, extend heartiest congratulations to the fellow-workers in Italy, and, in doing so, desire to express the hope that the work of such pioneers as Galvani, Volta, Pacinetti and Ferraris may be renewed and repeated by other members of the Italian race in the century which is now dawning. America owes a deep debt of gratitude to Italy for electrical discoveries, which have done so much to abridge distance and add to the welfare of mankind. Please communicate these sentiments to King Humbert in the name of the New York Electrical Society.

GANO S. DUNN, President.

*The present station in Milan, which is the outgrowth of the old station, was fully described in the ELECTRICAL REVIEW of May 10, 1899.

### Storage Batteries in Isolated Plants.

An interesting installation of storage batteries, auxiliary to an isolated lighting plant, was installed some time ago in the Hartford, Ct., station of the New York, New Haven & Hartford Railroad Company. The battery is used as a regulator, and exemplifies admirably its adaptability to unusual conditions of service.

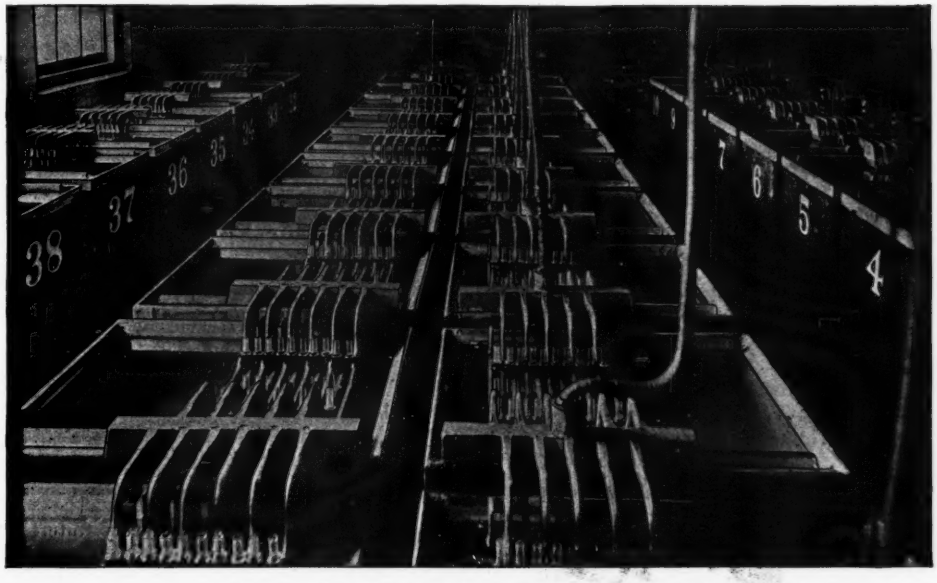



FIG. 1.—THE HARTFORD ACCUMULATOR INSTALLATION.

It will be remembered that this railway operates a large section of its suburban service electrically. This is a third-rail system, operating at 500 volts, and is subject to all the fluctuations of voltage incident to such a system on account of the current required for starting and accelerating the trains.

The fluctuations in the voltage on the railroad circuit are most violent at this point, as the Hartford station is located at the end of the third-rail system, and, as there are no feeders, the current supplied is furnished by the third rail only. The fluctuations in the voltage on the railroad system were so great that lamps could not be operated from an ordinary motor-driven generator without battery, a combination of the motor-driven generator and regulating battery being finally decided upon.

The generating unit consists of a 45-kilowatt shunt-wound generator, direct-coupled on a common bed-plate to a specially compound-wound, 500-volt motor, the compounding being so designed as to run the motor as nearly as possible at a constant speed through large variations of voltage in the motor circuit, which is derived from the third-rail system of the railroad.

The plant is installed in a small, brick structure built against the railroad right of way, the generating unit in one end of the building and the battery in the remaining part of the building and partitioned off from the generating plant. The battery is shown in Fig. 1.

The scheme of operation and the results obtained are well exemplified in the curves shown in Fig. 2. The lower curve gives an excellent idea of the extreme variations in the motor circuit. It will be noticed that this covers a range of 375 volts, or from a minimum of 175 volts to a maximum of 550 volts. The battery is directly across the system as a regulator, receiving its charge through the hours of light load, as will be seen by reference to the left-hand set of curves in Fig. 2, and only being required to furnish a small amount of current when the generator current drops off—due to fall in the voltage on motor—to a point below the lighting load shown by the straight line across the curve; but as the lighting load increases, it will be noticed, from the right-hand set of curves in the same figure, that there is a large portion of the time when the generator is unable to furnish the current required for the lighting load and which is, in turn, supplied by the battery. This, consequently, keeps a practically constant pressure on the lamp circuits, discharging whenever the generator current falls below the load and charging when the reverse occurs.

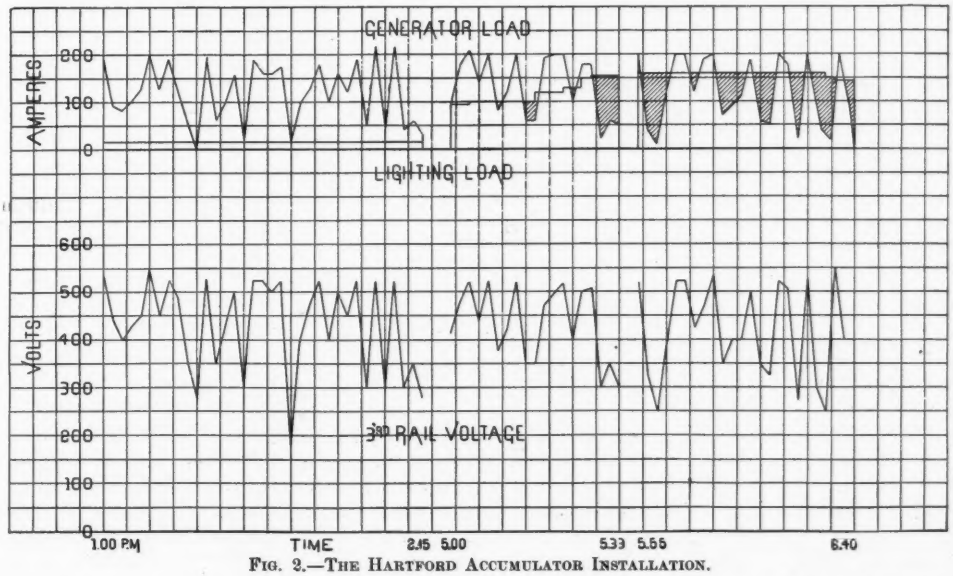



FIG. 2.—THE HARTFORD ACCUMULATOR INSTALLATION.

In addition to this service, when the lighting load falls off to a minimum, the generator is shut down and the battery furnishes all the current required at such time, constant potential being maintained by the ordinary method of cutting in reserve cells by the switches shown on the lower panel of the switchboard.

The battery consists of 62 cells of chloride accumulator, made and installed by the Electric Storage Battery Company, of Philadelphia. Eleven plates are mounted in each cell, but the tanks are large enough to allow the doubling of this number. The cells are all in one tier, on special porcelain insulators, the plates being burned to solid lead bus-bars, according to standard practice.

### The American Alkali Company.

The American Alkali Company, which will operate the Rhodin electrolytic process at a plant to be built at Sault Ste. Marie, have elected a board of directors and the following officers: President, W. W. Gibbs; vice-president and general manager, F. H. Clergue; second vice-president, George Philler; secretary and treasurer, Clayton E. Platt.

The American Alkali Company has contracted with the Lake Superior Power Company for such an amount of power as it will require at a price of $10 per horse-power per year for 24 hours per day every day in the year. The company will have lime on its own property, and salt at the cost of pumping into its plant. The Rhodin process was described in the ELECTRICAL REVIEW for May 3.

### NEW YORK ELECTRICAL EXPOSITION NOTES.

The H. B. Camp Company, of Altman, Ohio, makes a fine display of vitrified conduit for electrical purposes. These conduits are shown in built-up sections and also separately.

The Adams-Bagnall Electrical Company, Cleveland, Ohio, are showing a full line of their enclosed arc lamps, some types of which have attracted much attention.

Machado & Roller, of New York, have one of the most complete exhibits in the building, consisting of Whitney electrical instruments of all sorts—ammeters, voltmeters, wattmeters, testing sets, etc.

The Appert Glass Company, of New York, have an interesting exhibit of glass ducts and conduits and many forms of glass showing the use to which this material can be put in electrical and other work.

The Electrical Engineer Institute of Correspondence Instruction is showing, in its booth, some interesting experiments with an electric forge. The exhibit is in charge of Mr. Jefferson Wetzler.

The American Circular Loom Company exhibits a sort of pyramid of its flexible conduit, and has its comfortable booth equally illuminated by a most elaborate electric sign and the genial presence of Mr. H. B. Kirkland.

The American Vitrified Conduit Company, of New York, displays its conduit in built-up sections, and also shows a manhole and distributing-box, exhibiting how the tile-pipe is used in connection with brickwork in underground electric installations.

The Columbia Incandescent Lamp Company make a departure from the ordinary exhibit of lamps and show the filament of an incandescent lamp in all its stages, from a shapeless lump of material to the completed product. The booth is elaborately lighted and decorated.

The Incandescent Electric Light Manipulator Company, Boston, which manufactures a machine for handling and cleaning incandescent lamps in inaccessible situations, has a well equipped booth, in which the manipulator is shown in practical operation by Mr. Frank W. Morse.

The Orient Electrical Company, of Youngstown, Ohio, has a small but very tasteful exhibit and a very artistic electric sign. A few handsome and useful souvenirs, in the shape of bill pocket-books, have been given out by the gentlemen in charge of the exhibit.

The American Electric Specialty Company, of New York, show Monarc enclosed arc lamps, time switches for "winking" electric signs, and diagnostic sets for physicians' use. The ohmmeter, which is a particular specialty of this company, is exhibited at work by Mr. M. A. Newman.

The General Incandescent Arc Light Company are making a very handsome display of their enclosed arc lamps, Paragon desk and ceiling fan motors, and other specialties which they control. The exhibit is very tastefully decorated and arranged.

Frink's reflectors are shown in very handsome style in a large space on the south side of the hall. Here are gathered these well known reflectors for all purposes of lighting—stores, churches, show-windows, theaters, etc. Some of the designs are new and very elaborate.

The Crocker-Wheeler Electric Company, of New York, exhibit in their space 15 sizes of motors and dynamos, and also the field frame of a very large multipolar, direct-current generator. Many rheostats, controllers, etc., are also shown, together with a very compact motor dynamo for direct-current transformation between 110 and 375 volts.

"Cling-Surface" is shown in a practical exhibit, consisting of two similar and equally loaded dynamos driven by belts from the same pulley of an electric motor, one belt being in the ordinary condition, while the other has been treated with Cling-Surface. Under conditions of equal load the difference in operation is easily visible.

The Libbey Glass Company, of Toledo, Ohio, have one of the handsomest exhibits at the exhibition. Here they display a variety of glassware, most of which is not electrical, and among other things incandescent lamp bulbs, lamp globes, etc. The railing of the handsome booth occupied by this display is made of incandescent lamp bulbs on the ends of the original glass tubes, and is at once unique and beautiful.

The McCay Engineering Company, Baltimore, Md., show an attractive exhibit of their regulating sockets. In the center of their exhibit is a switchboard, equipped with Keystone indicating and measuring instruments, to show the variations of current demand for different degrees of light in lamps provided with these sockets. By their use lamps may be raised or lowered, as gas-jets are, by turning the socket switch.

The Safety Insulated Wire and Cable Company, has its exhibit in one of the most artistic and handsomely arranged booths in the show. The special feature of it is the elaborate arrangement of electric signs which constantly change colors. Many samples of wire and cable are displayed, and a large and powerful gramophone extols the merits of Safety wire and cables to the passers by.

The American Engine Company, of Bound Brook, N. J., are exhibiting in operation a new duplex compound engine of 75 horse-power direct-coupled to a 50-kilowatt direct-current American Ball dynamo. The engine is of extremely compact design and occupies no more floor space than a single high-speed engine of the same power, yet gives the economy of a compound type. It has but a single valve and valve gear.

The Joseph Dixon Crucible Company, of Jersey City, N. J., have an exhibit of graphite products for electricians and others, including resistance rods, boxes for baking lamp filaments, graphite dust, electrotyping graphite, belt-dressing and lead pencils of almost innumerable variety. Mr. John H. Baird, the New York agent, is in charge of the exhibit, and is giving away several handsome souvenirs in graphite.

John A. Roebling's Sons Company, of New York, make a handsome display of copper and steel wire and cable. Against a well finished wood background are displayed samples of copper wires of all sorts, and the manufacture of copper wire is illustrated in all the stages, from the rough ingot of native copper to the finished product. The railing of this booth consists of a piece of 10-inch wire rope, said to be the largest wire rope ever constructed.

The International Correspondence Schools, of Scranton, Pa., make an exhibit which is unique and, at the same time, very interesting. Their books, pamphlets and methods of instruction are shown together with experimental and laboratory electrical apparatus used in their courses. The pavilion in which the exhibit is made is of very pleasing design, the columns on the front being made to represent stacks of books. A valuable souvenir booklet, describing the schools' electrical course, is given free to visitors.

The Bullock Electric Manufacturing Company, of Cincinnati, Ohio, make an exhibit that is very complete in its details and highly interesting. They show many varieties of machine tools equipped with direct-coupled electric motors and adapted for a large variety of work. Some very handsome small sets for yacht lighting, etc, are also exhibited and the sign of the company—done in colored incandescent lights upon a gigantic revolving globe—is one that can not fail to attract the attention of even the most casual visitor.

The exhibit of the Wagner Electric Manufacturing Company, of St. Louis, offers several attractions to central-station managers who are trying to improve their day-load. The exhibit comprises a seven and one-half-horse-power, 60-cycle, 110-volt, single-phase, alternating-current motor, operating a six-kilowatt, 110-volt, direct-current generator. Current is taken from this generator through a switchboard, on which are mounted direct current voltmeters and ammeters, alternating-current ammeters and voltmeters, and an indicating wattmeter for registering current supplied to an exhaust fan. A three-horse-power, 60-cycle, 110-volt, single-phase motor is shown belted to a ventilating fan. A new type of switchboard instruments is also shown. The new switches, which are about to be placed on the market, are on exhibition, and have many new characteristics. A full line of standard lighting and motor transformers are also shown.

### Death of Ex-Governor Roswell P. Flower.

On the evening of May 12, ex-Governor Roswell P. Flower died suddenly at the Eastport (Long Island) Country Club, where he had gone for a few days' recreation.

Mr. Flower was a commanding figure in Wall Street, and a man of many and varied financial interests. He was one of the pioneers in the development of the immense system of electric traction in Brooklyn. He secured control of the Brooklyn Heights Railroad Company, and made it the nucleus around which was gathered the system known as the Brooklyn Rapid Transit Company.

Born in 1835, Mr. Flower well understood the meaning of poverty in his youth. His career as man of business, member of Congress, Governor of New York state and financier was almost uniformly successful. His estate is estimated at $25,000,000.

Messrs. Gatlin and Radford have purchased at public auction from the Mayor of Murray, Ky., a franchise for the erection of an electric light plant.

### An Electrical Pencil.

They have some curious things at the electrical show. One of them is a variety of lead-pencil, given away by an enterprising manufacturer as an advertisement. The body of it is painted red, white and blue, like a barber's pole, and at the top of it is a round block, labeled "battery," from which extends a wire ending in a ring that can be set on any of the colors. The other day a well known electrical man was approached by another man with one of the pencils.

"Fine thing, isn't it?" said the latter.

"What?"

"Electric pencil. Writes red, white or blue. You set it for the color with this ring and wire arrangement."

"That's interesting. Let me try it," said the electrical man. And he tried it. But the pencil made only black marks. "This thing's a failure," he said. "How do you work it?"

"Lemme have it," said the other man. "This is the way. Put the ring on the red part of the pencil and it will write red. See, like this (producing a sheet of paper)—r-e-d. It's dead easy."

The remainder of the conversation was not suitable for publication.

## ITEMS OF INTEREST.

Mr. J. E. Keelyn, of the Western Telephone Construction Company, Chicago, was in New York city last week.

It is reported that a company will soon be incorporated to furnish gas in Rochester, N. Y., at $1 per 1,000 feet, and electric light and power at correspondingly low rates.

The demand for electrical apparatus from France continues to increase as the season advances. A New York engineering firm has just received orders from Paris for four large sized dynamos and other machinery for electrical road equipment. In all, upward of $32,000 worth is to be shipped in the next six months to Havre.

There has been a great deal of discussion in the newspapers recently as to who deserves the credit for the capture of Iloilo. According to the story of a naval officer in *Harper's Weekly*, the town, after a bombardment by the "Boston" and the "Petrel," was captured by 48 sailors from the "Boston," and General Miller and the troops had no part in the capture.

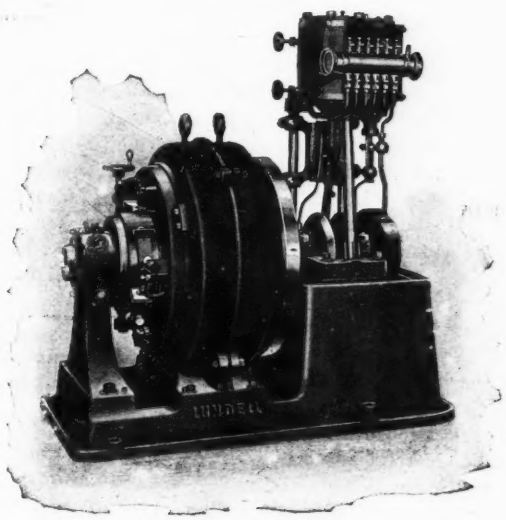
On May 1 the Brooklyn, N. Y., Rapid Transit Company assumed the management of the Nassau Electric system and the Brooklyn Union Elevated road, and both will be operated in connection with the Heights road. President Rossiter issued a general order announcing these appointments: Ira S. McCormack, general superintendent of transportation; J. C. Breckinridge, chief engineer of the construction and maintenance department; F. S. Drake, superintendent of shops, and Lincoln Van Cott, purchasing agent.

The Illinois Central Railroad is using telephones extensively for train dispatching. The advantages of the telephone were brought to its attention of necessity when certain track elevation work made it necessary to handle all trains of the St. Charles Air Line over a single track three-fourths of a mile. Over the single track there is an average of 87 trains daily. In five months the telephone system handled 88,664 trains without accident. The ease and quickness of telephone orders make it appear that the telephone will largely supersede the telegraph in train dispatching.

It is reported from Baltimore that the agreement for consolidation of the Edison Electric Illuminating Company, the Brush Electric Company and the Northern Electric Company, under the name of the United Electric Company, of Baltimore, has been consummated. The price paid for the properties aggregated $3,525,000. The syndicate now controls all the street railways and all the electric lighting systems in the city. The railways have been united under the name of the United Railways Company, and it is said that this company will be a separate institution from United Electric.

### Direct-Connected Marine Generating Set.

The illustration herewith shows a Lundell generator driven by direct-connection to a Forbes marine-type engine. The size of the generator shown is nominally eight kilowatts capacity, having a speed of 500 revolutions per minute, and capable of operating an equipment of 160 16-candle-power lamps at full candle-power. This set has been installed on the steam yacht "Postmaster-General," now doing duty in New York Harbor. When the plant was installed, an exhaustive test was made, which showed that the apparatus is capable of developing 10.8 kilowatts, supplying 216 lamps. As the primary qualities in a direct connected set for marine work, especially on yachts and similar classes of vessels, is compactness, light weight, ability to stand overloads, and accessibility, it will be seen that these points are met when it is mentioned that the total weight of this set is 1,050 pounds, or about one-eighth of one pound per watt output. The amount of space taken is small, being 27 inches wide by six feet two inches long, the height being 38 inches. One particular feature of this set is that the center of gravity is low, insuring a great degree of stability. The ability of the generator to carry an overload without sparking at the brushes is due to the series-wound armature and the use of a single field coil, which is a peculiar feature of Lundell generators. This single coil magnetizes all the different field poles to the same degree of intensity. The armature is well ventilated. The commutator is large in diameter and breadth of face, which allows the commutator to run cool. The magnetic circuit is very short, requiring less copper to energize the field, and thus conduces to high efficiency.




A DIRECT-COUPLED MARINE GENERATING SET.

The details of both generator and engine are carefully worked out; the engine runs smoothly and without vibration. The generator, it is asserted, will meet the most exact specifications in regard to heating, sparking limits and efficiency.

The Sprague Electric Company, 20 Broad street, New York, state that they are supplying these directed-connected types in the following sizes: eight kilowatts, 16 kilowatts and 32 kilowatts, generating current for 160, 320, 360 and 640 lamps, respectively.

## BUSINESS NOTES.

**The Western Electric Company,** Chicago, has constructed an extensive arc-light switchboard for the Ottawa Electric Company, Ottawa, Ontario. The board is built of marble panels and mounted in an iron frame. It is designed for 24 circuits and 24 arc dynamos. The company is also installing in Hillman's department store, Chicago, one 60-kilowatt and one 100 kilowatt, 110-volt generators, and a two-panel, five-circuit switchboard; 112 petite arc lamps and 1,500 incandescent lamps will be used for the interior illumination of the store.

**"Two Days at Niagara Falls"**—The latest issue of the Four-Track Series is one of its most attractive numbers. It is a narrow octavo volume of 64 pages, beautifully printed on heavy coated paper with illuminated cover. The book is full of reproductions of photographs of scenes about the Falls and that wonderful 38 miles of river, gorge and cataract. The New York Central is ahead on advertising, and the "Four-Track Series" is the most attractive and instructive set of books of the kind ever published. A copy of No. 9—"Two Days at Niagara Falls"—will be sent free, post-paid, to any address on receipt of two two-cent stamps by George H. Daniels, general passenger agent, Grand Central Station, New York.

**The Illinois Electric Company,** who are Chicago agents for Lundell fan motors, state that they have received their first shipment of 1,000 motors. They have arranged a beautiful display of the various sizes and styles of these fan motors in their salesroom, 239 Madison street, Chicago, Ill. Mr. Healy, president of the company, says that they have every indication that this will be one of the most lively and prosperous seasons in the electrical supply business, particularly that part of it relating to fan motors. The Illinois Electric Company's business extends over a vast territory tributary to Chicago, the volume of business each month showing an extremely gratifying increase over that of the previous month.

### The Commercial Possibilities of Wireless Telegraphy.

In an editorial note the *Mechanical Engineer*, of Manchester, Eng., says:

There is little doubt that wireless telegraphy has within the past few weeks achieved a distinct scientific triumph. Although the distance over which it was found practicable to transmit perfectly readable signals showed no extraordinary development upon what had been previously accomplished, the fact that it was possible to hold communication between countries separated by a narrow arm of the sea attracted attention probably out of proportion to the event; still, it demonstrated in a striking and convincing manner that wireless telegraphy was no mere laboratory system, but gave distinct evidence of real utility. It had been long known among scientific authorities that it was merely a question of time for Marconi to achieve distances greater than that between Bournemouth and the Isle of Wight, and it is to the credit of the distinguished inventor that he has succeeded in transmitting signals over a greater distance than has been attempted by any other system of wireless telegraphy employing electric or magnetic agencies. Each succeeding stage in the development of etheric telegraphy tends to modify one's preconceived notions as to the possibilities that lie before such systems. Although discounting the somewhat improbable notions that have been promulgated as to the potentialities of this application of electric science, one might hesitate to pronounce on the finality of the etheric transmission of signals. It is possible, however, to apply with a greater degree of certainty the crucial test of commercial utility.

In this utilitarian age, when the value of scientific development is measured only by its practical and commercial aspect, it is perhaps natural to seek some information as to the directions in which Marconi's system of telegraphy is likely to be of use, and in suggesting the limitations and principal applications of the system, we are mindful that the unremitting research of inventors and scientific men generally may render possible to-morrow what is impossible to-day. At the outset it may be declared with some amount of assurance that wireless telegraphy is unlikely to supplant any of the inland telegraph systems which exist to-day. If it were possible to dispense entirely with land-lines and underground cables, the saving in capital expenditure and maintenance charges would be enormous, but a slight investigation into the peculiar conditions set up in the ether by Marconi's signals would preclude the system being used over wide areas. The very fact that it has been found hitherto impossible to shield any wireless telegraph station so that it would not respond to signals coming from one station and yet be able to take signals from another, suggests that for telegraphing between several distinct places it is impracticable. It is true that many occasions arise in which it is impossible to maintain the overhead lines incidental to ordinary telegraph work between isolated points, and this especially applies in warfare that is being conducted in a barbarous or semi-barbarous country. Under such conditions it would appear to possess a rare degree of usefulness. The merits of the system, so far as signaling from lighthouses, lightships and the mainland is concerned, have been sufficiently demonstrated in the case of the South Foreland experiments, where for some considerable period wireless telegraphy has been in operation between the shore and the lightship, and the very fact that neither foggy nor stormy weather impairs the apparatus in the slightest degree constitutes one of its strongest claims to the consideration of those authorities who are responsible for the safe navigation of the seas around our coasts. It may be observed, in reference to lighthouses and lightships being in direct communication with the shore, that many of the attempts to connect these points by means of submarine cables have signally failed.

It has to be pointed out against the system of wireless telegraphy that the transmission of signals is a somewhat slow operation, the speed of an expert operator probably not exceeding the transmission of messages through a submarine cable; that of itself would suggest that the system would have a limited field of operation. To some extent it might supplant submarine cable work over distances which were not considerable, but then again the difficulty of making the stations irresponsible to stray signals constitutes a strong argument even against this application. In spite, therefore, of the really great work that has been accomplished, and recognizing to the full what may be attained, it appears to us that as far as the commercial application of wireless telegraphy is concerned, there is not very much to hope for, at any rate before a considerable period has elapsed. In certain well-defined directions, such as communication between coast-guard stations and passing vessels, and even between vessels themselves, there is no doubt considerable scope for wireless telegraphy.

The difficulties, however, of prognosticating the future developments of electrical science are great. Some days ago Mr. Tesla's suggestion of utilizing the ether as a medium for transmitting energy capable of doing work of considerable magnitude was openly scoffed at. Whether or not his hopes of transmitting energy through space are to be realized it is difficult to say, but this may be said, he has succeeded (and records of this are only just to hand from America) in lighting a lamp of 1,500 candle-power solely by means of electrical vibrations transmitted through space. That alone is sufficient to prevent one condemning offhand many of the ideas that electricians have been recently putting forward; but in the light of present knowledge the use that can be made of the ether as a means of transmission appear to be limited.

### American Institute of Electrical Engineers.

At the annual election of the American Institute of Electrical Engineers, held in New York on May 16, the following officers were elected for the ensuing year: President, Dr. Arthur E. Kennelly; vice-presidents, J. W. Lieb, Jr., Charles F. Scott, L. B. Stillwell; managers, C. O. Mailloux, S. Dana Greene, C. S. Bradley, W. D. Weaver; secretary, Ralph W. Pope; treasurer, George A. Hamilton. At the evening session Mr. Frank J. Sprague read an important paper on the "Multiple System of Electric Railways," illustrated by a working model and lantern slides.

### Electric Vehicle Company.

The Electric Vehicle Company has increased its capital stock from $10,000,000 to $12,000,000. The $2,000,000 increase of capital stock is divided into 20,000 shares of common stock at $100 each.

### Electric Storage Battery Company.

The Electric Storage Battery Company, of Philadelphia, has increased its capital stock to the extent of $4,500,000, making its total capitalization $18,000,000.

### Wood Seasoning by Electricity.

In a recent issue of a European trade journal, there is a description of a new process of seasoning wood and timber by electricity, known as the Nodon-Bretoneau process. The effect of the electrical treatment seems to be to expel the sap and replace it by insoluble matter which will not putrefy, and to increase the tenacity of the wood and its resistance to vertical compression. This is said to be the first industrial application of the principle of electric osmose. If the electrodes in an electrolytic solution are separated by a porous partition and a current passes, the volume of the liquid in contact with the positive pole diminishes, while that in contact with the negative pole increases. The process is about as follows: The positive pole of a dynamo is connected with a lead grating, upon which the wood to be treated is placed. A solution, which is kept at the uniform temperature of 100° F. by means of a steam-pipe underneath the grating, is poured into the vat so as to almost cover the log of wood treated. At a public demonstration, the solution used contained 10 per cent of borax, five per cent of resin, and three-fourths of one per cent of carbonate of soda, the borax being used on account of its antiseptic properties and the carbonate of soda to help dissolve the resin. A porous tray, the bottom of which consists of two sheets of canvas with a sheet of felt between, is placed over the log, and a sheet of lead connected with the negative pole of the dynamo is placed above this. When the current is turned on, the solution is drawn from the bottom and the sap is driven out, and its place taken by the borax and resin; the time required for a 10-inch log is about seven or eight hours, and then the wood is slowly dried, which takes, in the open air, in Summer, several weeks or even months. It was stated that a kilowatt-hour of electrical energy was required for every six cubic feet of timber treated.

### Fort Wayne Electric Works.

The Fort Wayne Electric Works, with principal business office in Schenectady, has been incorporated at Albany, N. Y., with a capital of $500,000, to manufacture electrical and other apparatus. The directors are Henry Paul, C. S. Bash and J. W. White, of Fort Wayne, Ind.; S. D. Greene, J. P. Felton, E. E. Gilbert and George C. Hollister, of Schenectady.

## CHICAGO ELECTRICAL TRADE NOTES.

The Electric Appliance Company, of Chicago, have been appointed western agents of the Gutmann recording wattmeter, and claim the meter will catch the interest of all station managers. The meter works accurately on any load beginning at 20 watts, and the mechanical construction is finely made. The factory where the meter is made affords excellent facilities for its manufacture, and invites the most minute investigation as to its merits. The meter is placed upon the market by a company who will use every effort to push the sales.

Gates & Randolph is a new firm of electrical manufacturers' representatives, located at 1420 and 1422 Marquette Building. Chicago, and is composed of J. Holt Gates and R. T. Randolph. Mr. Randolph has until recently represented the Sterling Arc Lamp Company, of New York, as manager of the sales department, and has recently resigned that position to form a partnership with Mr. Gates. They will represent the following companies: Warren Electric Manufacturing Company, of Sandusky, Ohio; Triumph Electric Company, of Cincinnati, Ohio; American Electric Specialty Company, Elmer Morris and F. A. LaRoche, of New York city.

The American Electric Vehicle Company, West Van Buren street, Chicago, will be represented at the New York Electrical Exposition by general manager E. B. Corrigan, who left Chicago for the East some days ago. The various types of motor carriages made by the American Electric Vehicle Company are presented in a neat catalogue, which has been generously distributed throughout the United States and foreign countries. The vehicles made by this concern are of a superior style and finish and handsomely constructed. The battery combines lightness, durability, and is very compact in form, and can be stowed away in a very small space. Their make of carriages is popular and their sales have been brisk.

The Wabash and West Shore railroads have been selected as the route over which the Chicago and western delegation will go to the twenty-second annual convention of the National Electric Light Association, to be held at Madison Square Garden, New York city, in connection with the Electrical Exposition. This has been arranged by the Transportation Committee, and a special train of elegant Wagner vestibuled sleeping-cars is scheduled to leave Chicago—Dearborn station—at 12.02 noon, Sunday, May 21, via the Wabash, arriving in New York at 3.30 P. M. the following day over the West Shore Railroad. A special rate of $24, which is one and one-third fare for the round trip, has been granted for this occasion. The train will be under the personal escort of Mr. H. C. Keeran, the city passenger and ticket agent of the Wabash line at Chicago, and this fact assures the party they will be well taken care of. Mr. Keeran has accompanied several of the trains going to the conventions of the American Street Railway Association meetings, and is well known among the electrical fraternity. There promises to be a good attendance from the West at the coming convention, and considerable interest is manifested in the Electrical Exposition.

The Wagner Electric Manufacturing Company, of St. Louis, Mo., have grown in seven years from a comparatively small concern, capitalized at $25,000, to a company now capitalized at $500,000, doing a flourishing business. They state that they attribute their growth to their successful efforts to put upon the market types of high-grade apparatus which has met the popular demand. A new factory is now building for them, which, when completed, will about double their manufacturing facilities. Their machines are well known, and their sales have steadily increased.

F. E. C.

## Telegraphs and Telephones in Madagascar.

United States Consul Gibbs writes from Tamatave as follows:

The Morse open-circuit system is used here. The messages are received on rolls of tape, similar to the stock-quotation tickers in use on the New York and other American stock exchanges. There are about 1,200 miles of line and wire at present, and the net is being increased. The telegraph, connected with the Post-Office Department, is controlled by the French Government.

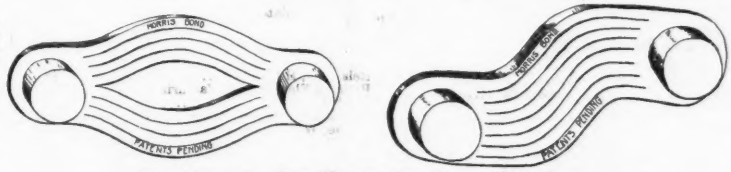
It is not thought possible to introduce any improved telegraph system into Madagascar, owing to climatic conditions. The present system is out of order about one-third of the time; so much so, that a bulletin as to its condition is published in the tri-weekly editions of the *Journal Official* of the island. There is a telephone, used principally by the government offices. It is the Ader system. Business does not demand its general adoption by the commercial houses. I do not think conditions propitious for the successful establishment of telephone exchanges.

Any circulars relating to the introduction of enterprises into Madagascar should be in French, to receive attention. Commercial and speculative transactions are conducted almost entirely in this language.

## The Morris One-Piece Rail-Bond.

Since the advent of the first successful electric railway, some 10 or 12 years ago, the changes which have been rung on all the details of construction have been innumerable, and the process of commercial evolution has reached into every department, from the power-house to the farthermost rails on the track.

One of the details found defective was the rail-bond, and from time to time this has been improved. Engineers and managers gradually found that it paid to devote special attention to the integrity and low resistance of the return circuit. And the ELECTRICAL REVIEW can point with pride to its early campaign in favor of plenty of capacity in the devices and methods to be used for electrically connecting the track-rails. Largely owing to that campaign the subject of rail-bonding became more and more important. But even to-day the average manager hates to pay the cost of a thorough bonding of his tracks, and hundreds of railways are wasting money hourly in coal used to drive the current through a track circuit, which is a disgrace to an otherwise up-to-date system. Of late years the leaning has been toward a short flat copper bond applied at the rail-joint between the fish-plate and the rail, the rail-bond being made moderately flexible to allow for motion of the rails up and down and to and fro. To get a large contact surface, engineers have called for very large "terminals" on the bonds, and manufacturers have had to resort to casting or hydraulic compression of such heads or terminals onto flexible wire straps, thus making the bond in three pieces.




FIGS. 1 AND 2.—THE MORRIS ONE-PIECE RAIL-BOND.

A new rail-bond is now being introduced by Elmer P. Morris, the well known railway supply dealer, of 15 Cortlandt street, New York, which is somewhat radical in departing from the old lines, while being the perfection of simplicity. The new rail-bond is illustrated herewith, and is made throughout of a single piece of rolled or drawn electrolytic copper of the highest conductivity. The terminals can be made any desired size, and the connecting strap is formed into a number of narrow parallel strips which confer the desired flexibility, and expansion and contraction of the rails is taken care of by bowing these strips outwardly, or bending them into the form of an ~.

The method of manufacture allows of a wide range of capacity. The terminals may be any diameter from five-eighths inch up to one inch or more, and the capacity of the connecting strip from that of a 2/0 copper wire up to 8/0; and, being of wrought copper in one piece, the conductivity is fully up to copper wire.

Meeting all requirements of flexibility, contact surface and capacity, and adaptability to go under the fish-plate, and being absolutely of a single piece of metal, the Morris rail-bond ought to meet with great favor among railway engineers and managers.

## Electrical Plant in a Washington Hotel.

No expense has been spared to make the Raleigh the finest modern hotel in Washington, D. C. It stands on Pennsylvania avenue and Twelfth street. The electrical work was installed by the Westinghouse Electric and Manufacturing Company. The engines and electric generators are placed in a vault extending under the sidewalk. The generators have a capacity of 300 kilowatts and are direct-connected to two engines. The electric current operates four elevators and a large number of Westinghouse ventilating fans distributed throughout the hotel. The electric lighting is furnished by the same plant. Large lamps illuminate the halls and reception parlors, and incandescent lamps are in every room.

Exquisite and artistic effects have been arranged in the parlor, café and writing-rooms, by grouping a number of incandescent lamps of variegated colors. The marble walls reflect the lights from the cornices and chandeliers, adding beauty to the elaborate and tasteful designs. The attractive sign, "The Raleigh," on the hotel front, is illuminated at night by 500 incandescent lamps. Westinghouse electric motors are used in the laundry to rotate the washing machines and to perform the duties, previously done by hand, of the flat iron and mangle.

Governor Roosevelt concludes the story of his regiment in the June *Scribner's*, with a striking letter from a school teacher, telling how some of the Rough Riders adjusted themselves to the conditions of peace on their return home. It is a tribute to the affection in which the Colonel was held by his regiment.

## ADVANCE INFORMATION

### New Telephone and Telegraph Companies.

NEW BREMEN, OHIO—The New Bremen Telephone Company has been incorporated; capital, $6,000; incorporators, T. Purpus, E. Purpus, A. C. Burr, A. Boesell, Jacob Frite, all of New Bremen.

PIQUA, OHIO—The Piqua Home Telephone Company has been incorporated; capital, $75,000; incorporators, L. M. Frerh, H. K. Wood, J. L. Prugh, H. T. Dittman, S. Boal, J. S. McKinney, Wm. Sniff, J. G. Bartelle, E. Johnson, G. H. Rundle, J. G. Hagan, M. A. Snyder, W. G. Smith, all of Piqua.

TRUMBULL CORNERS, N. Y.—The Trumbull Corners Telephone Company has been incorporated; capital, $300; incorporators, J. D. Smith, Wheeler Smith, Wm. L. Puff, all of Trumbull Corners.

CHURCHVILLE, N. Y.—The line of the Bell Telephone Company will be extended on from this place east to Chili Station.

MARIAVILLE, N. Y.—A telephone company has been organized by residents of this neighborhood, to construct a line from this place to Minaville, to connect there with the Hudson River Company's line. George Lasher was elected president; A. C. Cullings, secretary; D. W. Walpole, treasurer; David Peek, Harvey Merry and Dr. W. H. DeLamater, directors.

SMITHVILLE, TEX.—The Smithville & Red Rock Telephone Company has been incorporated; capital stock, $1,000; purpose, to construct and maintain a telephone line between Smithville and Red Rock; incorporated by W. L. Moore, Yerger Hill, W. D. C. Jones, J. W. Burkett and E. Reink.

PATESVILLE, KY.—The Cumberland Telephone Company will run a line from this place to Cloverport.

PENDLETON, ORE.—Pendleton is to have telephonic connection with Long Creek, 100 miles south of here. Articles of incorporation have been filed by W. J. Furnish and R. W. Fletcher, of Pendleton, and Jeremiah Despain, of Ukiah, who have organized the Pendleton Telephone Company, with a capital stock of $8,000.

MILLERSBURG, OHIO—The Millersburg, Wooster & Orville Telegraph Company has been incorporated; capital, $100,000; $60,000 paid in; incorporators, George Adams, H. W. Cary, John E. Koch, Jr., M. M. Herron, all of Millersburg, Ohio; John M. Erwalt, Mount Vernon, Ohio.

ARCHBOLD, OHIO—The Archbold Telephone Company has been incorporated, to build telephones connecting Archbold, Stryker, Bryan and Edgerton, Ohio; capital, $10,000; incorporators, Frank B. Ufer, Chas. McLaughlin, J. C. King, Fred J. Ballmeyer, A. J. Murback, all of Archbold.

CHICAGO, ILL.—The Independent Telephone Company has been incorporated; capital, $2,500; incorporators, Blanche Hovey, M. G. Musgrave, John R. Lyman.

PULASKI CITY, VA.—The Wythe Telephone Exchange has been incorporated; capital, $5,000; incorporators, D. D. Hull, Jr., B. F. Garnett, B. Laughon, George M. Holstein, all of Pulaski.

### New Incorporations.

NEW YORK, N. Y.—The Diagnostic Electric Lamp Company has been incorporated; capital, $2,500. Directors, John W. Morrison, New York; Jacob Felsenstein, Baltimore, and Edgar Poe Reese, New York.

BLUEFIELD, W. VA.—The East River Electric Company, of this city, has been organized, with the following officials: President, Edwin Mann; vice-president, W. A. Cather; secretary and treasurer, W. P. Hawley; directors, Edwin Mann, W. A. Cather, S. E. Morriss, R. E. Johnson, C. M. McCulloch, J. W. Ruff, W. C. Pollock, C. A. Shirey, W. P. Hawley.

HARTFORD, CT.—The Sanderson & Porter Company has been incorporated; capital stock, $10,000. Incorporators: E. N. Sanderson, New York, 49 shares; E. D. Robbins, Wethersfield, 50, and Andrew J. Broughel, Jr., Hartford, one share.

TRENTON, N. J.—The Kern Incandescent Light Company, with a capital stock of $12,000,000, has been incorporated. The incorporators are Ernest F. Ayrault and Charles W. Dayton, of New York, and J. P. Murray, Jersey City. The company proposes to operate gas works and manufacture and sell gas appurtenances and attachments.

SCHENECTADY, N. Y.—The Fort Wayne Electric Works has been incorporated, to manufacture and sell electrical and other apparatus; capital, $500,000; directors, Henry Paul, C. S. Bash and J. W. White, Fort Wayne; S. D. Greene, J. P. Felton, E. E. Gilbert and George C. Hollister, Schenectady.

### New Electric Railways.

SYCAMORE, ILL.—A franchise has been granted the Geneva Lake, Sycamore & Southern Electric Road by the trustees of the town of Cortland.

WHITINSVILLE, MASS.—The Board of Selectmen has granted a franchise to the Linwood Street Railway Company to operate electric cars. It is thought the road will be in operation within a short time.

NORWALK, OHIO — The County Commissioners have granted to S. F. Angus and H. A. Haigh, of Detroit, the right to conduct the proposed electric railway from Bellevue to Norwalk via Monroeville. The grant is to remain in force for 25 years. Work is to be begun in six months, and the road is to be completed within 16 months from date of grant. Rate of fare is not to exceed two cents per mile, no fare less than five cents, and all fares to be computed on the basis of five cents and multiples thereof.

### Increase of Capital.

ST. LOUIS, MO.—The Wagner Electric Manufacturing Company has increased its capital stock from $250,000 to $500,000.

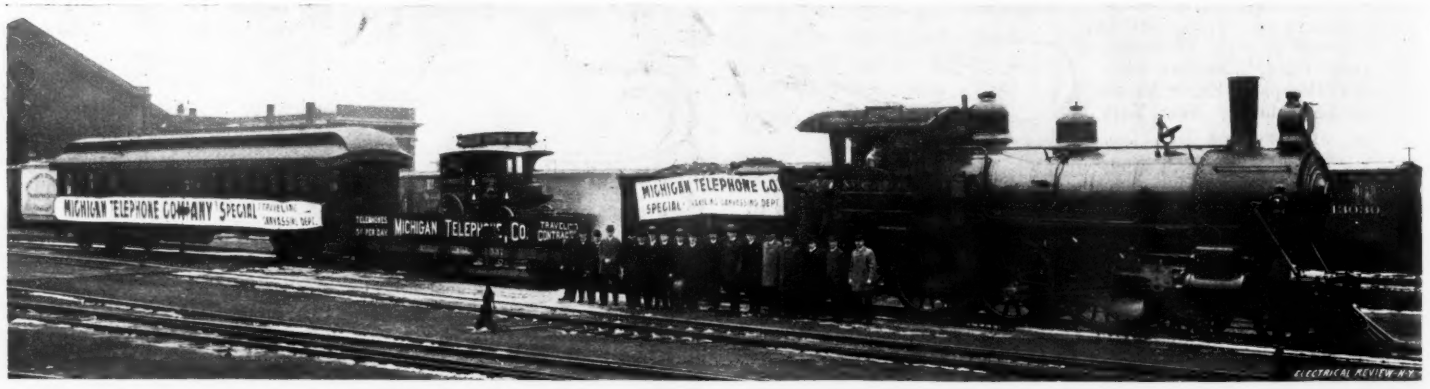
GRAND RAPIDS, MICH.—The Citizens' Telephone Company has increased its capital stock from $200,000 to $300,000.

NEW YORK, N. Y.—The Electric Storage Battery Company has increased its capital stock to the extent of $4,500,000, making its total capitalization $18,000,000.

### Up-to-Date Telephone Enterprise in Michigan.

The illustration on this page shows a special canvassing train which the Michigan Telephone Company uses in its territory as an aid in extending its business. The idea of sending out a canvassing train, fully equipped and manned, was conceived and carried into successful operation by Mr. C. E. Nester, chief contract agent of the company. The practical result would seem to be that the main offices of the company, in their full efficiency, can in effect be moved about from place to place at will and the territory desired to be covered can be visited in a systematic and unusually thorough manner.

Under the able direction of President Charles J. Glidden, of the Erie Telegraph and Telephone Company, which controls the Michigan Telephone Company, the latter company is making progress at a rapid rate. The estimates approved for extensions during the year 1899 cover the cost of adding to the system 20,000 subscribers, 3,500 miles of long-distance pole line and several thousand miles of long-distance wires. In addition to this there will be erected 12 exchange buildings in the most important cities of the state of Michigan, costing, including land, about $250,000. The directors recently voted to resume dividends at the rate of one and one-fourth per cent quarterly.




SPECIAL CANVASSING TRAIN OF THE MICHIGAN TELEPHONE COMPANY.

The National Electric Company, capital $25,000,000, has been incorporated at Trenton, N. J. The company is to make and supply coke, gas, oil, electricity, heat, compressed air, liquefied air, or any power now known or which may hereafter be discovered. The company is registered with the New Jersey Corporation, Guarantee and Trust Company, the nominal incorporators being employés of that company.